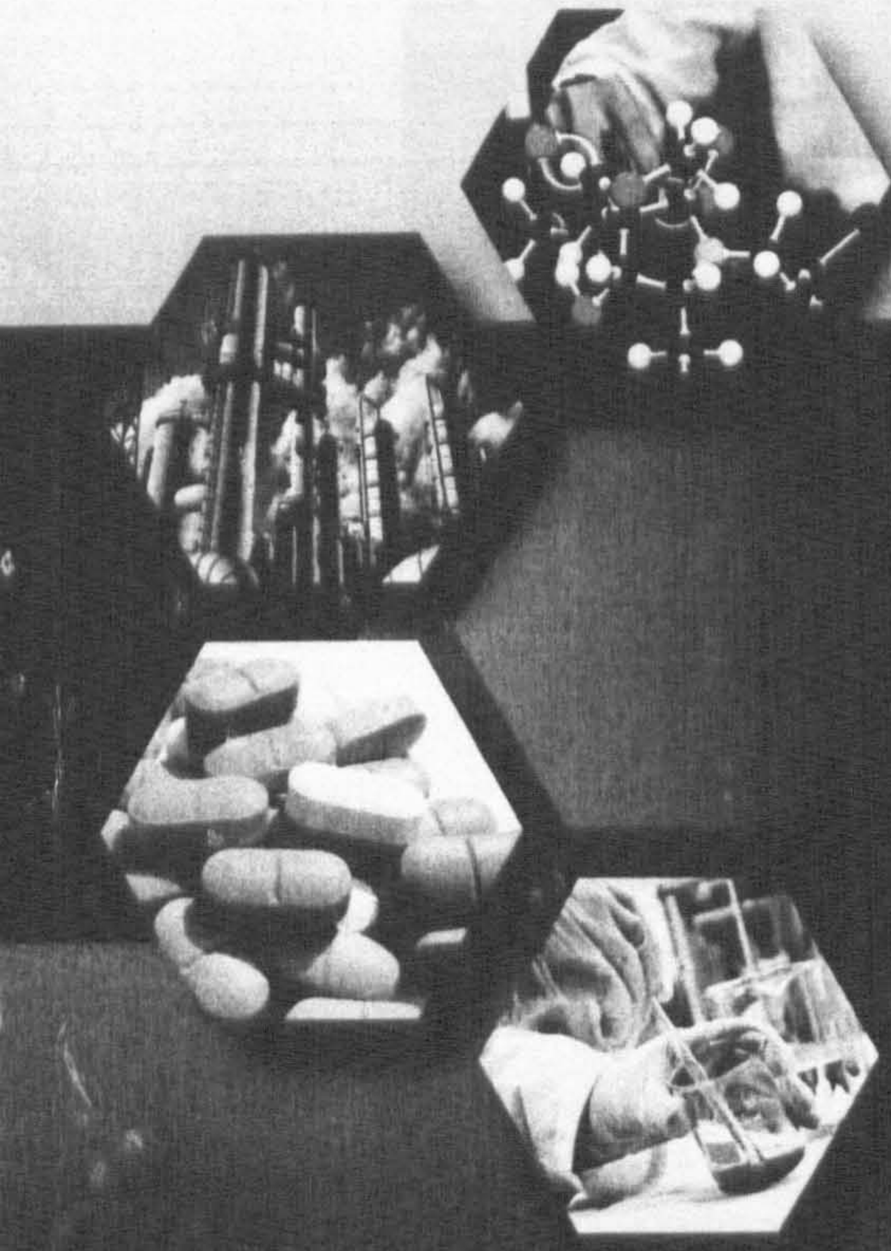
PROGRAMME & ABSTRACT BOOK

INTERNATIONAL CONFERENCE IN ORGANIC SYNTHESIS 2016

"From Fundamental Research to Industrial Applications"



ICOS 2016

21st - 24th August 2016

Riverside Majestic Hotel | Kuching, Sarawak

Organizer
Institute of Science
Universiti Teknologi MARA (UiTM)

Co Organizer
Faculty of Resource Science & Technology
Universiti Malaysia Sarawak (UNIMAS)

ICOS 2016

INTERNATIONAL CONFERENCE IN ORGANIC SYNTHESIS 2016

21 – 24 August 2016
Riverside Majestic Hotel, Kuching Sarawak, MALAYSIA

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Universiti Malaysia Sarawak

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Foreword from the Vice Chancellors of Universiti Teknologi MARA (UiTM) and Malaysia Sarawak (UNIMAS)

YBhg. Prof. Emeritus Dato' Dr Hassan Said

YBhg. Prof. Dato' Dr Mohamad Kadim bin Suaidi

Welcome to all delegates of the International Conference in Organic Synthesis 2016 (ICOS2016). We understand that this is the first scientific meeting for international organic chemistry community held in Kuching, Sarawak. Nonetheless, two similar meetings were held at national level in 2009 and 2012 highlighting the important roles of organic synthesis towards the scientific advancement in the field of chemical and physical sciences in our country. We are proud that Institute of Science, Universiti Teknologi MARA (UiTM) together with the Faculty of Resource Science and Technology, Universiti Malaysia Sarawak (UNIMAS) take the initiative to organize this meeting.

Organic chemistry has had a profound effect on modern life. It has improved natural materials and it has synthesized natural and artificial materials that have, in turn, improved health, increased comfort, and added to the convenience of nearly every product manufactured today. With respect to the importance of organic chemistry in life, this noble effort can be a platform for scientists and researchers from academia and industries to share ideas/knowledge, exchange research opportunities, generate networking, and eventually produce beneficial effects to meet the needs of the present and future of human existence and global environment. In addition to the customary fundamental aspects of organic chemistry ranging from chemical reactions and methodologies, this conference is also highlighting organic synthesis in advanced materials research, drug discovery and process development. Its theme "from fundamental research to industrial applications" is very much in line with the programs outlined in our country's Second Science & Technology (S&T) Policy to utilize S&T as a tool for sustaining economic development and for improving quality of life.

The Organizing Committee has also made a point of encouraging the active involvement of postgraduate research students as they represent the future leaders of our discipline in academia, in industry and in research organizations. This is also consistent with our government's higher education strategies to increase the number of doctorates in Malaysia. We are sure that our respectable guests and speakers will undoubtedly assist and support us in strengthening and improving our research agenda and postgraduate activities.

We are certain that the Organizing Committee of the conference has been working very hard to ensure a fruitful meeting of minds. We look forward to actively pursuing researches aimed at generating products for the betterment of human existence and global environment. With keen researchers, creditable infrastructure and conducive learning environment, UiTM and UNIMAS have the opportunity to significantly contribute towards not only the development of chemical industries in this country but also the generation of new scientific knowledge. We invite you to participate actively in this conference and we hope that this will be a continual event.

Thank you.

Vice Chancellors

Universiti Teknologi MARA (UiTM)

Universiti Malaysia Sarawak (UNIMAS)

Foreword from the Advisors & Program Chairmen

On behalf of the organizing committee, it is our great pleasure to extend our personal welcome to you to the International Conference in Organic Synthesis 2016 (ICOS2016) which is held in Riverside Majestic Hotel, Kuching, Sarawak. The conference starts on Monday, 22 August 2016 with a full range of academic sessions along with a dinner reception, and finishes on Wednesday, 24 August 2016 with a leisure trip to the Sarawak Cultural Village. We would also like to express our gratitude to all the committee members from Institute of Science, Universiti Teknologi MARA (UiTM) and Faculty of Resource Science and Technology, Universiti Malaysia Sarawak (UNIMAS) for their willingness to work hard prior to this event. The success of this meeting will be largely due to them.

The main aim of this conference is to provide opportunity for organic chemists to come together to present their research findings, to discuss matters of common interest and to ponder on the development of the global scientific community generally, and our country Malaysia specifically. The other objective of this event is to highlight the important roles of organic synthesis towards the scientific advancement of chemical and physical sciences and development of chemical industries by using forward-looking visions of experts and by dissemination and exchange of knowledge. Scientists and researchers from various academic institutions, industries and private sectors should take advantage of this event to develop collaboration as well as create networking and linkages.

The topics proposed to be discussed in this conference are specific towards synthesis, mainly organic synthesis. Many young chemists and researchers have submitted their abstracts and will be presenting their work in this meeting. Nonetheless, a number are also attending with the intention just to learn more about synthesis. The enthusiasm and willingness of these young scientists to subject their work to the scrutiny of their peers is a comforting sign that the future of Organic Synthesis especially in Malaysia is in good hands.

We would like to thank the plenary and invited speakers, participants and sponsors who have contributed towards the success of this conference. We hope this conference will strengthen relations among Malaysian organic chemists with international scientists, and contribute towards global scientific progression through the beneficial effects of skills and knowledge shared. Thank you.

Prof. Dr Ahmad Sazali Hamzah
Advisor, ICOS2016
Universiti Teknologi MARA (UiTM)

Assoc. Prof. Dr Othman Bojo
Advisor, ICOS2016
Universiti Malaysia Sarawak (UNIMAS)

Assoc. Prof. Dr Zurina Hj. Shaameri
Chairperson I, ICOS2016
Universiti Teknologi MARA (UiTM)

Assoc. Prof. Dr Zainab Ngaini
Chairperson II, ICOS2016
Universiti Malaysia Sarawak (UNIMAS)

Dr. Mohd Fazli Mohammat,
Chairperson III, ICOS2016
Universiti Teknologi MARA (UiTM)

ORGANIZING COMMITTEE OF INTERNATIONAL CONFERENCE IN ORGANIC SYNTHESIS 2016

YBhg. Prof. Emeritus Dato' Dr Hassan Said
Vice Chansellor
Universiti Teknologi MARA

YBhg. Prof. Dato' Dr Mohamad Kadim bin Suaidi
Vice Chansellor
Universiti Malaysia Sarawak

Professor Dr Ahmad Sazali Hamzah
Director, Institute of Science
Universiti Teknologi MARA

Associate Professor Dr Othman Bojo
Dean, Faculty of Resource Science &Technology
Universiti Malaysia Sarawak

Assoc. Prof. Dr Zurina Hj. Shaameri, *UiTM*
Assoc. Prof. Dr Zainab Ngaini, *UNIMAS*
Dr Mohd Fazli Mohammat. *UiTM*

Assoc. Prof. Dr Zurina Hj. Shaameri
Universiti Teknologi MARA, *UiTM*

Prof. Dr Ahmad Sazali Hamzah
Universiti Teknologi MARA, *UiTM*

Zaleha Afandi, *UiTM*
Siti Qistina Mohd Najid, *UiTM*

Dr Mohd Fazli Mohammat
Universiti Teknologi MARA, *UiTM*

Dr Karimah Kassim, *UiTM*

Dr Karimah Kassim
Universiti Teknologi MARA, *UiTM*

Irmaizatussyehdany Buniyamin, *UiTM*
Afreeda Firdaus, *UiTM*
Nurul Wahida Aziz, *UiTM*
Cik Dayang Norafizan Awang Chee, *UNIMAS*
Wan Nurainie Wan Ismail, *UNIMAS*
Cik Ratnawati Hazali, *UNIMAS*
Pn Amira Satirawaty Mohamed Pauzan, *UNIMAS*

Assoc. Prof. Dr Zainab Ngaini
Universiti Malaysia Sarawak, *UNIMAS*

Dr Tay Meng Guan
Univesiti Malaysia Sarawak, *UNIMAS*

Assoc. Prof. Dr Shafida Abd. Hamid
International Islamic University Malaysia, *IIUM*

Assoc. Prof. Dr Emilia Abd Malik
Universiti Putra Malaysia, *UPM*

Prof. Dr Hasnah Osman
Universiti Sains Malaysia, *USM*

Dr. Sreenivasa Rao Sagineedu
International Medical University, *IMU*

Mohd Azrin b Abd. Rahim, *UiTM*
Dr Rafeah bt. Wahi, *UNIMAS*
Leo Bulin ak Unting, *UNIMAS*
Mohd Zaidi b Marlan, *UiTM*
Mohd Hishamuddin b Wang, *UNIMAS*
Raymond ak Patrick Atet, *UNIMAS*
Benedict anak Samling, *UNIMAS*
Norhasnan Sahari, *UiTM*
Ismadi b Rosli, *UNIMAS*
Rajuna b Tahir, *UNIMAS*

Muhamad Faizal Abd Halim, *UiTM*
Dr Sim Siong Fong, *UNIMAS*
Pn. Cik Masni Soberi, *UiTM*

Plenary and Invited Speakers

"from fundamental research to industrial applications"

PLENARY SPEAKERS

PROF. DR MINORU ISOBE

Professor Minoru Isobe, Professor Emeritus at Nagoya University, is currently attached to Chulabhorn Research Institute (CRI) Bangkok, Thailand. He received his PhD from Nagoya University in 1969 and Doctor of Agriculture (Silkworm Diapause Hormone) in 1973. He did his postdoctoral research at Columbia University on the Total synthesis of Prostaglandin F2α in 1973-1975. His research focuses on organic chemistry, natural product chemistry, bioorganic chemistry, stereocontrolled synthesis, synthetic methodology, bioluminescence, marine toxins, insect hormone and chemistry for biology. Professor Isobe received several awards which include the Young Chemists Award, Agricultural Chemical Society of Japan in 1986 and Japan Society of Organic Synthesis Award in 1996. In 2000 he received another award from the Agricultural Chemical Society of Japan on his work entitled "Bioorganic Studies on Chemical Communication in Biological System", of which the name was later changed to the Japan Society for Bioscience, Biotechnology, and Agrochemistry. He also received the Medal with Purple Ribbon (紫綬褒賞) from the Emperor of Japan in 2008 and the Princess Chulabhorn Gold Medal Award of Thailand in 2012. To date, Professor Isobe has published an impressive number of scientific articles.

PROFESSOR BIING-JIUN UANG

Professor Biing-Jiun Uang is a professor in the Department of Chemistry at National Tsing Hua University (NTHU), Taiwan. He received his MSc from the same university in 1979 and received his PhD from Yale University in 1984. Before returning to National Tsing Hua University, he did his postdoctoral research at the California Institute of Technology in 1984-1985. His research interests include organic synthesis, natural product synthesis and asymmetric synthesis.

INVITED SPEAKERS

PROF DR HADI NUR
Centre for Sustainable Nanomaterials
(CSNano)
Universiti Teknologi Malaysia (UTM)
Malaysia

PROF DR HASNAH OSMAN
School of Chemical Sciences
Universiti Sains Malaysia (USM)
Malaysia

PROF. DR NOORSAADAH ABD RAHMAN
Department of Chemistry
Universiti Malaya (UM)
Malaysia

PROF. LIANG CHENG
Institute of Chemistry
Chinese Academy of Sciences
(CAS)
China

PROF. KATSUNORI TANAKA
RIKEN
Japan

PROF. XUEFENG JIANG
East China Normal University
China

PROF LIN GUOQIANG
Shanghai Institute of Organic Chemistry,
China

Programme Schedule

"from fundamental research to industrial applications"

PROGRAMME SCHEDULE

21st AUGUST 2016 (Sunday)	
Time	**Program**
5.00 -7.00 pm	Pre-Registration

22nd AUGUST 2016 (Monday)			
Time	**Program**		**EMCEE**
8.00-8.30 am	Registration		***Assoc. Prof. Dr. Zurina Shaameri (UiTM)***
8.30-8.45 am	Welcoming Remarks		
8.45-9.30 am	**Plenary Speaker 1** *Prof. Dr. Minoru Isobe*		
9.30-10.00 am	**Invited Speaker 1** *Prof. Dr. Noorsaadah Abd Rahman*		
10.00-10.30 am	Coffee Break Poster Viewing & Poster Judging Session (Group A)		
10.30 -11.00 am	**Invited Speaker 2** *Prof. Dr. Liang Cheng*		
	Parallel Session 1a	Parallel Session 1b	
11.00-12.20 pm	Oral Presentation (4 presenters)	Oral Presentation (4 presenters)	**Session 1a** MC: ***Prof Gwendoline Cheng Lian Ee (UPM)*** Time keeper: *Muhammad Siddiq Bin Maarop* Session 1b MC: ***Dr. Mohd Bakri Bakar (UTM)*** Time keeper: *Muhammad Faezuan Bin Nor Izuddin*
12.20-12.50 pm	Poster Viewing & Poster Judging Session (Group B)		
12.50 -2.10 pm	Lunch Break		
2.10 -2.40 pm	**Invited Speaker 3** *Prof. Dr. Hadi Nur*		***Assoc. Prof. Dr. Zainab Ngaini (UNIMAS)***
2.40-3.10 pm	**Invited Speaker 4** *Prof. Dr. Guoqiang Lin*		
	Parallel Session 2a	Parallel Session 2b	
3.10 -5.10 pm	Oral Presentation (6 presenters)	Oral Presentation (6 presenters)	**Session 2a** MC: ***Dr. Khairil Juhanni binti Abd Karim (UTM)*** Time keeper : *Norhasliza Bt Kamaruddin* **Session 2b** MC: ***Dr. Norazah (UTM)*** Time keeper: *Dr. Agustono Wibowo*
5.10 -5.30 pm	Tea Break End of Day 1		

Conference Dinner 7.30 pm-10.00 pm

23rd AUGUST 2016 (Tuesday)			
Time	**Program**		**EMCEE**
8.45-9.30 am	**Plenary Speaker 2** *Prof. Dr. Biing-Jiun Uang*		***Prof. Dr. Noorsaadah Abd. Rahman (UM)***
9.30-10.00 am	**Invited Speaker 5** *Prof. Dr. Katsunori Tanaka*		
10.00 -10.30 am	Coffee Break Poster Viewing & Poster Judging Session (Group C)		
10.30 -11.00 am	**Invited Speaker 6** *Prof. Dr. Hasnah Osman*		***Ass. Prof. Dr. Melati Khairuddean (USM)***
11.00-11.15 a.m	Industrial Talk from Sanyo Chemical Laboratories Malaysia Sdn. Bhd.		
	Parallel Session 3a	Parallel Session 3b	
11.15 -12.35 pm	Oral Presentation (4 presenters)	Oral Presentation (4 presenters)	**Session 3a** MC: ***Dr. Sreenivasa Rao Sagineedu (IMU)*** Time keeper: *Noor Hidayah Binti Pungot* **Session 3b** MC: ***Dr. Shafida Abd hamid (IIUM*** Time keeper: *Noraishah Binti Abdullah*
12.35-12.55 pm	Poster Viewing & Poster Judging Session (Group D)		
12.50 -2.10 pm	Lunch Break		
2.10-2.40 pm	**Invited Speaker 7** *Prof. Dr. Xuefeng Jiang*		***Prof. Dr. Azhar Ariffin (UM)***
	Parallel Session 4a	Parallel Session 4b	
2.40-5.00 pm	Oral Presentation (7 presenters)	Oral Presentation (7 presenters)	**Session 1a** ***Dr. Asnuzilawati Asari (UMT)*** MC: Time keeper: *Nur Aini Binti Azib* **Session 1b** MC: ***Dr Yeun-Mun Choo (UM)*** Time keeper: *Fatin Nur Ain Bt Abdul Rashid*
4.40-5.20 pm	Best Poster Award & Closing		
5.20-5.40 pm	Tea Break End of Day 2		

24th OGOS 2016 (Wednesday) | Leisure Trip to Sarawak Cultural Village

8.30 am -1.00 pm

Oral Presentation Schedule

"from fundamental research to industrial applications"

ORAL PRESENTATION SCHEDULE

22nd August 2016 (Monday)			
Session 1a (Venue: Sarawak Chamber) ***MC: Prof Gwendoline Cheng Lian Ee (UPM)***			
Time	**Participant's name**	**Abstract Title**	**Institution**
11.00-11.20 a.m	**Khairil Juhanni Abd Karim***, Nurul Faizah Abd. Ghapar, Nurul Asyikin Sailan and Hashim Baharin	Polymer Grafted Chitosan for Controlled Release Fertilizer (CRF) Behaviour Study	Universiti Teknologi Malaysia (UTM)
11.20-11.40 a.m	**Ruwaida Asyikin Abu Talip**[1]*, Meng Guan Tay[1], Hasyimatul Fatma Hashim[2]	Synthesis, Characterization and Antibacterial Activity of Hydrazone Schiff Base Compounds and their Derivatives	Universiti Malaysia Sarawak (UNIMAS)
11.40-12.00 p.m	**Amina Yasin**,* Rajan Jose, Mashitah M. Yusoff	Design & Development of Multifunctional Porphyrin Macromolecules	Universiti Teknologi Pahang (UMP)
12.00-12.20 pm	**Noor Hidayah Pungot**[1], Zurina Shaameri[2]*, Noorhana Hussain[2]	Synthesis towards Pachydermin and the Tautomerism of its 3-Acyltetramic Acid Intermediates	Universiti Teknologi MARA (UiTM)
Session 1b (Venue: Deer Suite) ***MC: Dr. Mohd Bakri Bakar (UTM)***			
Time	**Participant's name**	**Abstract Title**	**Institution**
11.00-11.20 a.m	**Norsyafikah Asyilla Binti Nordin**[1*], Zainab Ngaini1, Hasnain Hussain[2], Paul Matthew Neilsen[3], Hwang Siaw San[3]	Synthesis and Biological Properties of Aspirin bearing Phenyl Thiourea Moiety	Universiti Malaysia Sarawak (UNIMAS)
11.20-11.40 a.m	**Noraishah Abdullah**[1], Zurina Shaameri[2]*, Mohd Fazli Mohammat[2] and Ahmad Sazali Hamzah[2]	An Efficient Aldol Reaction utilizing Novel Prolinamide-Based Organocatalysts in Aqueous Media	Universiti Teknologi MARA (UiTM)
11.40-12.00 p.m	Noorakmar Jusoh[1], **Shafida Abd Hamid**[1]*, Noraslinda M. Bunnori[2]	Synthesis and Molecular Docking of Carvone Derivatives as potential Neuraminidase Inhibitors	International Islamic University Malaysia (IIUM)
12.00-12.20 pm	**Sabahat Sardar**, Cecilia Devi, Jean Marc Leveque, Asad Mumtaz	One-Pot Multicomponent Syntheses and Characterization by Synthesized Task Specific Protic Ionic Liquids	Universiti Teknologi PETRONAS (UTP)

ORAL PRESENTATION SCHEDULE

22nd August 2016 (Monday)			
Session 2a (Venue: Sarawak Chamber) ***MC: Dr. Khairil Juhanni binti Abd Karim (UTM)***			
Time	**Name**	**Abstract Title**	**Institution**
3.10-3.30 p.m	**M. Nadeem Akhtar**[1*], Swee Keong Yeap[2], Seema Zareen[1], Siti Noor Hajar Zamrus[1], Addila abu Bakar[1], Saiful **Nizam bin Tajdudin**[1] **and** Noorjahan Banu Alitheen[3]	Small Molecules with Potential Biological Activities	Universiti Malaysia Pahang (UMP)
3.30 -3.50 p.m	Zainal Abidin Hasan[1], **Azhar Ariffin**[1], Woon Kai Lin[2]	Synthesis, Characterization and Physical Properties of Carbazole Dendrimers as Blue Host Materials for Organic Light-Emitting Diodes	Universiti of Malaya (UM)
3.50-4.10 p.m	**Fatin Nur Ain Abdul Rashid**[1], Mohd Fazli Mohammat[2]* and Ahmad Sazali Hamzah[2]	Synthesis Of Novel Enamines Series Of 2-Oxo-4-Carboethoxy-5-Aryl-3-Aminopyrrolidine As Potential New Anti Microbial Agents	Universiti Teknologi MARA (UiTM)
4.10-4.30 p.m	**Melati Khairuddean***, Zuhair Jamain, Siti Amira Saidin	Synthesis and Characterization of 1,4-Phenylenediamine Derivatives Containing Hydroxyl and Cyclotriphosphazene as Terminal Group	Universiti Sains Malaysia (USM)
4.30-4.50 p.m	**Mojtaba Tabandeh** and Thorsten Heidelberg	Novel Biantennary Glycolipids for Targeting Vesicular Delivery Systems	Universiti of Malaya (UM)
4.50-5.10 p.m	**Nur Aini Azib**[1], Zurina Shaameri[2]*, Ahmad Sazali Hamzah[2]	An Asymmetric Approach for the Synthesis of γ-Lactone-γ-Lactam as an Advanced Intermediate towards Omuralide Derivatives	Universiti Teknologi MARA (UiTM)
Session 2b (Venue: Deer Suite) ***MC: Dr. Norazah (UTM)***			
Time	**Name**	**Abstract Title**	**Institution**
3.10-3.30 p.m	Imran Fakhar, Bohari Yamin and **Siti Aishah Hasbullah***	New bisthiourea derivatives with amino acid side chain linkers and their binding behavior with selected metal ions	Universiti Kebangsaan Malaysia (UKM)
3.30 -3.50 p.m	**Shajarahtunnur Jamil***, Mohamed Shafiq Suleiman and Norazah Basar	Synthesis of Hydroxylated Coumarinyl Chalcones As Potential Antioxidant Agents	Universiti Teknologi Malaysia (UTM)
3.50-4.10 p.m	**Siti Noor Hajar Zamrus**[1], M. Nadeem Akhtar[1*], Swee Keong Yeap[2], Seema Zareen[1], and Saiful Nizam Tajuddin[1]	Synthesis and Characterization of Diarylheptanoids	Universiti Malaysia Pahang (UMP)
4.10-4.30 p.m	**Nurul Syafiqah Rezali** [1], Zurina Shaameri [2] and Ahmad Sazali Hamzah [2*]	Chemical Explorations Of Pyrrolidine-2, 3-Dione: Friedländer, Curtius Rearrangement And Acyl Hydrazide Reactions	Universiti Teknologi MARA (UiTM)
4.30-4.50 p.m	Masna Banu[1], Tan Joe Jen[1], **Mallikarjuna Rao Pichika**[2*], Raghavendra Sakirolla[2], Kavitha Mohandas[3], Ahmad Sazali Hamzah[4]	Synthesis of 3-(*p*-amino phenyl)-5-furyl-1,2,4 triazole and evaluation of its potential for the treatment of gram-negative bacterial sepsis	International Medical University (IMU)
4.50-5.10 p.m	**Nurul Syazana Hasmaruddin**[1], Hasnah Osman[1]*, Mohd. Zaheen Hassan[1], Mohamed Ashraf Ali[1], Yeong Keng Yoon[2]	Synthesis and *In-silico* Studies of Some Novel Benzimidazole Derivatives	Universiti Sains Malaysia (USM)

ORAL PRESENTATION SCHEDULE

23rd August 2016 (Tuesday)			
Session 3a (Venue: Sarawak Chamber) ***MC: Dr. Sreenivasa Rao Sagineedu (IMU)***			
Time	**Name**	**Abstract Title**	**Institution**
11.00-11.20 a.m	**Nadia Mohamed Yusoff**[1], Hasnah Osman[1]*, Mohd. Zaheen Hassan[1], Mohamed Ashraf Ali[1] and Yeong Keng Yoon[2]	Synthesis, Characterization and *In-Silico* Studies of Dispiropyrrolidine Derivatives	Universiti Sains Malaysia (USM)
11.20-11.40 a.m	**Asnuzilawati Asari**[1,2*], Muhamad Fadzli Abd Razak [1], Ahmad Sazali Hamzah[3], Siti Nor Khadijah Addis[1,2] and Habsah Mohamad[2]	Synthesis and preliminary assessment of antibacterial activity of aaptamine derivatives	Universiti Malaysia Terengganu (UMT)
11.40-12.00 p.m	**Yoshiyuki Uruma***, Yuki Yoshida and Tatsuya Matsumoto	Toward for a synthesis of Keronopsin A_2	Yonago College, Japan
12.00-12.20 pm	**Azimah Saman** [1], A.M. Mimi Sakinah[1,2 *], A.W. Zularisam [2]	Extraction of Betacyanin from *Hylocereus Polyrhizus* Peel : Effect of Operating Conditions.	Universiti Malaysia Pahang (UMP)
Session 3b (Venue: Deer Suite) ***MC: Dr. Shafida Abd Hamid (IIUM)***			
Time	**Name**	**Abstract Title**	**Institution**
11.00-11.20 a.m	**Mohd Tajudin Mohd Ali***, Norazurein Hasbullah and Nurul Natasha Zaidi	The Synthesis of Water Soluble Polygalacturonic (PGA)-Betulinic Acid and Methoxy Polyethyleneglycol (mPEG)-Betulinic Acid Derivatives	Universiti Teknologi MARA (UiTM)
11.20-11.40 a.m	**Mazlin Mohideen**[1*], Nur Azzalia Kamaruzaman[1], Haslina Ahmad[2], Melati Khairuddean[3], Mohd Nizam Mordi[1], Sharif Mahsufi Mansor[1]	A Class Of Novel 2,9-Bis(Alkylated)-β-Carboline Intercalators: Synthesis, Crystal Structure, In Vitro Anti-Cancer Agents, And Ct-Dna Binding Study	Universiti Sains Malaysia (USM)
11.40-12.00 p.m	**Nornadia Jasin**[1]*, Meng Guan Tay[1], and Hashimatul Fatma Hashim[2]	Synthesis, Modification, Characterization and Biological Activity of Hydrazone Schiff Base	Universiti Malaysia Sarawak (UNIMAS)
12.00-12.20 pm	**Rubaiyi M. Zaid**, A.W. Zularisam, A.M. Mimi Sakinah*	Ultrasound-assisted Extraction and Characterizations of Pectins from Dragon Fruit (*Hylocereus polyrhizus*) Peels in Various Acid Solution: A Preliminary Study	Universiti Malaysia Pahang (UMP)

ORAL PRESENTATION SCHEDULE

23rd August 2016 (Tuesday)			
Session 4a (Venue: Sarawak Chamber) *Dr. Asnuzilawati Asari (UMT)*			
Time	**Name**	**Abstract Title**	**Institution**
2.40-3.00 p.m	**Tasya Ezzati Busrah*** and Zainab Ngaini	Synthesis and Studies of Biological Properties of Dihydropyrimidine-2(1H)-thione Derivatives	Universiti Malaysia Sarawak (UNIMAS)
3.00-3.20 p.m	**M.S. Siti Sabrina**, A.M. Mimi Sakinah*	Combination of Immobilization Techniques by Entrapment and Covalent Binding on Alginate Hydrogel Beads for Xylanase	Universiti Malaysia Pahang (UMP)
3.20-3.40 p.m	**Agustono Wibowo**, Zurina Shaameri, Mohd Fazli Mohammat and Ahmad Sazali Hamzah*	Stereoselective Reduction of 3-ketoproline Ethyl Ester Using Modified Borohydrides and Some Selected Vegetables.	Universiti Teknologi MARA (UiTM)
3.40-4.00 p.m	**Nurul Zawani Alias**[1], Wan Yaacob Wan Ahmad[2]*, Nurul Izzaty Hassan[2], Zaini Yusoff[1] and Sharizal Hasan[1]	Synthesis and Characterization of Coumaryl 1,3-Selenazole	Universiti Teknologi MARA (UiTM)
4.00-4.20 pm	Muhammad Aizam Hassan, **Norazah Basar,** Shajarahtunnur Jamil	Synthesis and Antibacterial Activity of Novel Coumarinyl Azo-Chalcones	Universiti Teknologi Malaysia (UTM)
4.20-4.40 p.m	**Addila Abu Bakar**[1], Muhammad Nadeem Akhtar[1*], Swee Keong Yeap[2], Nadiah Abu[3], Seema Zareen[1] and Saiful Nizam Tajuddin[1]	Synthesis of flavokawain A derivatives and their effects on breast cancer MCF-7 and MDA-MB-231 cell lines	Universiti Malaysia Pahang (UMP)
4.40-5.00 p.m	**Nyotia Nyokat**[1], Khong Heng Yen*[1], Ahmad Sazali Hamzah[2] Isabel Fong Lim[3] and Aimi Suhaili Saaidin[2]	Isolation and Synthesis of Pinocembrin and Pinostrobin from *Artocarpus odoratissimus*	Universiti Teknologi Malaysia (UTM)

ORAL PRESENTATION SCHEDULE

Session 4b (Venue: Deer Suite) *MC: Dr Yeun-Mun Choo (UM)*			
Time	**Name**	**Abstract Title**	**Institution**
2.40-3.00 p.m	**Naseem Ahmed** and Mohammed Waheed	Novel Coumarin Based Ligands in the Suzuki-Miyaura and Mizoroki-Heck Cross-Couplings under Aqueous Medium	Indian Institute of Technology Roorkee, India
3.00-3.20 p.m	**Ainaa Nadiah Abd Halim***, Zainab Ngaini	Synthesis and Antibacterial Studies of Bis(thiourea) Derivatives with Variable Chain Length	Universiti Malaysia Sarawak (UNIMAS)
3.20-3.40 p.m	**Felicia Phei Lin Lim**[1*], Giuseppe Luna[2], Rowena Xin Yi Gan[1] and Anton V. Dolzhenko[1,2]	A New Microwave-Assisted Approach for the Preparation of 4-Aminopyrazolo[1,5-*a*][1,3,5]triazines	Monash University
3.40-4.00 p.m	Mohd Bakri Bakar	Synthetic Strategies to Design Porphyrin Architectures	Universiti Teknologi Malaysia (UTM)
4.00-4.20 pm	**Ho Boon Kui**[1], Zainab Ngaini[1], Paul Neilsen[3], Hasnain Hussain[2], Reagan Entigu Linton[3]	Synthesis and Biological Study of Azo Derivatives and Aspirin-azo Derivatives	Universiti Malaysia Sarawak (UNIMAS)
4.20-4.40 p.m	Dayang Norafizan Bt A. Chee*, **Monica Lulo Rodis**, Norziah Saat	Evaluation of Antibacterial Activity of Organotin(IV) Complexes with Methyl-2-pyridylketone-2-hydrazinopyridine Ligand	Universiti Malaysia Sarawak (UNIMAS)
4.40-5.00 p.m	**Ahmad Nazif Aziz**[1,2]*, Muhammad Taha [2,3], Nor Hadiani Ismail [2,3], El Hassane Anouar [3], Sammer Yousuf [4], Waqas Jamil [5], Khalijah Awang [6], Norizan Ahmat [3], Khalid M. Khan [4] and Syed Muhammad Kashif [5]	3,4-Dimethoxybenzenamine Schiff Bases and their Antioxidant Activity	Universiti Malaysia Terengganu (UMT)

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"from fundamental research to industrial applications"

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2	**Julenah Ag Nuddin[1]*** and Ahmad Sazali Hamzah[2]	Pictet-Spengler Condensation: A Review of Total Synthesis of Canthin-6-one	Universiti Teknologi MARA (UiTM)	**P02**
3	**Nooraziah Mohd. Lair***, Hamid Khaledi, Noel Francis Thomas, Hapipah Mohd Ali.	Synthesis And Characterization Of Liquid Crystalline Compounds From Dibenzo Tetraaza[14]annulene And Its Nickel Complex	University of Malaya (UM)	**P03**
4	**Nur Amajeida Ismail[1]***, Abbas Abdulameer Salman[1], Hamid Khaledi[1], Landa Zeenelabdin Ali[2] and Hapipah Mohd Ali[1]	Synthesis, Characterization And Biological Activities Of Acridine Derivatives	University of Malaya (UM)	**P04**
5	**Norhasliza Kamaruddin[1]**, Mohd Fazli Mohammat[2]* and Ahmad Sazali Hamzah[2]	Synthetic Studies Towards Biologically Active of γ-lactam Sulfonamides Type Compounds via 1,4-conjugate Addition Reactions	Universiti Teknologi MARA (UiTM)	**P05**
6	**Zuhair Jamain**, Melati Khairuddean*, Nurul Nabilah Zulbaharen, Tham Keen Chung	Synthesis, Characterization And Determination Of Mesophase Transition Of Compounds With Different Terminal Chain Length	Universiti Sains Malaysia (USM)	**P06**
7	**Muhammad Siddiq Maarop[1]**, Mohd Fazli Mohammat[2]*, Zurina Shaameri[2], Ahmad Sazali Hamzah[2]	Synthesis of Ethyl 6-Amino-4-aryl-5cyano-1,4-dihydropyrano[2,3-c]pyrazol-3-carboxylate via One-pot Four-component Reactions	Universiti Teknologi MARA (UiTM)	**P07**
8	See Yen Lin, Ng Ling Li, Raghavendra Sakirolla, **Ramu Meesala***	Proline-Catalyzed Facile Synthesis of Vanillyl Derivatives	International Medical University (IMU)	**P08**
9	**Muhammad Faezuan Izuddin[1]**, Mohd Fazli Mohammat[2]*, Zurina Shaameri[2], Ahmad Sazali Hamzah[2]	Synthesis of Key Intermediate of Codonopsinine Employing α-Bromination of 2,3-Diketopyrrolidine	Universiti Teknologi MARA (UiTM)	**P09**
10	**Ameerul Hazeeq Hashim***, Abdul Qaiyum Ramle, Hapipah Mohd Ali, and Sharifuddin Md Zain	Theoretical Studies and Rational Design of Symmetrical and Unsymmetrical Squarine Dyes :An Application for Dye Sensitized Solar Cells (DSSC's)	University of Malaya (UM)	**P10**
11	**Abdul Qaiyum Ramle[1]***, Ameerul Hazeeq Hashim[1], Hamid Khaledi[2], Hapipah Mohd Ali[1], Sharifuddin Md Zain[1]	Tetraaza [14] Annulene-based DSSC dyes: Design, Synthesis and DFT Computational Studies	University of Malaya (UM)	**P11**
12	**Nurul I Hassan[1]***, Annick Vidonne[2], Alexandra MZ Slawin[2] and Douglas Philp[2]	Exploiting Amide Macrocycle in the Formation of [2]-Pseudorotaxane	Universiti Kebangsaan Malaysia (UKM)	**P12**

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15	**A.A.Nik Nor Aziati**[1*], A M. Mimi Sakinah[2]	Effect Of Time, Inoculum (%) And Mass Substrate on Succinic Acid By Immobilized Escherichia Coli In Fermentation Process	Universiti Malaysia Pahang (UMP)	**P15**
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18	**Sreenivasa Rao Sagineedu**[1], Raghavendra Sakirolla[1], Khaishin Tan[1], Ahmad Sazali Hamzah[2]	Protection and Deprotection of 1,2- and 1,3-Diols as Acetonides using PVP/Iodine, a Mild, Efficient and Reusable Catalyst	International Medical University (IMU)	**P18**
19	**Gwendoline Cheng Lian Ee***, Thiruventhan Karunakaran and Intan Safinar	Isolation of β-Mangostin and Semi-synthesis of Its Derivatives	Universiti Putra Malaysia (UPM)	**P19**
20	**Muna.Ali.Salem**[1*],Mallikarjuna Rao Pichika[2], Raghavendra Sakirolla[2]	Synthesis of Novel N-vanillylcycloalk-1-ene-1-carboxamide Derivatives	International Medical University (IMU)	**P20**
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22	**Noor Syahira Fauzi** and Shajarahtunnur Jamil*	Synthesis Of Chalcone Derivatives	Universiti Teknologi Malaysia (UTM)	**P22**
23	**Nor Saliyana Jumali**[2], Zurina Shaameri[1] and Ahmad Sazali Hamzah[1]	Stereoselective Reduction of 1-Benzyl-3,3-Dimethyl-5-Methylenepyrrolidine-2,4-Dione using Selected Metal Borohydrides	International Islamic University Malaysia (IIUM)	**P23**
24	**Raghavendra Sakirolla**[1*], Masna Banu[2], Mallikarjuna Rao Pichika[1], Kavitha Mohandas[3]	Synthesis of Novel Drug-like Compounds against Multi-drug Resistant Gram Negative Bacteria Targeting CTX-M Class A beta lactamase	International Medical University (IMU)	**P24**

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26	**Tan Joe Jen**[1*], Raghavendra Sakirolla[2], Mallikarjuna Rao Pichika[2], Geh Cha Meng[3], Hee Kah Seng[3], Cheok Jun Jack[3]	A Novel Method for Synthesis of New Vanilloids and *in vitro* Evaluation Their Anti-Inflmmatory Activity	International Medical University (IMU)	**P26**
27	**Nurul Izzati Abd Wahid,** Norazah Basar*, Hasnah M. Sirat, Ngai Mun Hong, Mohamad Syahrizal Ahmad	Synthesis Of Several Stereoselective Sesquiterpenoids From Xanthorrhizol And Zerumbone Isolated From *C. Xanthorrhiza* And *Z. Zerumbet* Respectively	Universiti Teknologi Malaysia (UTM)	**P27**
28	Karimah Kassim[1*] and Norsakinah Zurina Bt Zulkifli , **Siti Nurhazlin Jaluddin**[2,]	Palladium Supported on Nitrogen Based Metal Organic Frameworks as an Efficient and Reusable Catalyst for Heck Coupling Reaction	Universiti Teknologi MARA (UiTM)	**P28**
29	**Yean Kee Lee**[1,*], Kheng Soo Tay[2], Vannajan Sanghiran Lee[1], Noorsaadah Abd. Rahman[1]	Synthesis and Molecular Simulation of a Magnetically Recyclable Heterogeneous BINOL Organocatalyst for the Asymmetric Aldol Reaction	University of Malaya (UM)	**P29**

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"from fundamental research to industrial applications"

LIST OF All PARTICIPANTS

No.	Name	Institution	Entitlement
1	Nik Nor Aziati Abd. Aziz	Universiti Malaysia Pahang (UMP)	Poster Presenter
2	Abdul Qaiyum Ramle	University of Malaya (UM)	Poster Presenter
3	Aḍdila Abu Bakar	Universiti Malaysia Pahang (UMP)	Oral Presenter
4	Agustono Wibowo (Dr.)	Universiti Teknologi MARA (UiTM)	Oral Presenter
5	Ahmad Nazif Aziz	University Malaysia Terengganu (UMT)	Oral Presenter
6	Ainaa Nadiah Abd Halim	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
7	Ameerul Hazeeq Hashim	University of Malaya (UM)	Poster Presenter
8	Amina Yasin	Universiti Malaysia Pahang (UMP)	Oral Presenter
9	Asnuzilawati Asari (Dr.)	Universiti Malaysia Terengganu (UMT)	Oral Presenter
10	Azhar Ariffin (Prof. Dr.)	University of Malaya (UM)	Oral Presenter
11	Azimah Saman	Universiti Malaysia Pahang (UMP)	Oral Presenter
12	Eiji Nishimura	Sanyo Chemical Laboratories Malaysia Sdn. Bhd.	Non-presenting participant
13	Fatin Nur Ain Abdul Rashid	Universiti Teknologi MARA (UiTM)	Oral Presenter
14	Felicia Phei Lin Lim	Monash University	Oral Presenter
15	Gwendoline Cheng Lian Ee (Prof.)	Universiti Putra Malaysia (UPM)	Poster Presenter
16	Ho Boon Kui	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
17	Jeh-Jeng Wang (Prof.)	Kaohsiung Medical University, Taiwan	Poster Presenter
18	Julenah Ag Nuddin	Universiti Teknologi MARA (UiTM),	Poster Presenter
19	Khairil Juhanni Abd Karim (Dr.)	Universiti Teknologi Malaysia (UTM)	Oral Presenter
20	Lee Pin Sheng	Sanyo Chemical Laboratories Malaysia Sdn. Bhd.	Non-presenting participant
21	Muhammad Nadeem Akhtar (Assoc. Prof.)	Universiti Malaysia Pahang (UMP)	Oral Presenter
22	Siti Sabrina Mohd sukri	Universiti Malaysia Pahang (UMP)	Oral Presenter
23	Mak Kit Kay	International Medical University (IMU)	Poster Presenter
24	Mallikarjuna Rao (Prof.)	International Medical University (IMU)	Oral Presenter
25	Masnah Banu	International Medical University (IMU)	Poster Presenter
26	Mazlin Mohideen	Universiti Sains Malaysia (USM)	Oral Presenter
27	Melati Khairuddean (Ass. Prof. Dr)	Universiti Sains Malaysia (USM)	Oral Presenter
28	Mohd Bakri Bakar (Dr.)	Universiti Teknologi Malaysia (UTM)	Oral Presenter
29	Mohd Tajudin Mohd Ali (Dr.)	Universiti Teknologi MARA (UiTM)	Oral Presenter
30	Mojtaba Tabandeh	University of Malaya (UM)	Oral Presenter
31	Monica Lulo Rodis	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
32	Muhammad Faezuan Izuddin	Universiti Teknologi MARA (UiTM)	Poster Presenter
33	Muhammad Siddiq	Universiti Teknologi MARA (UiTM)	Oral Presenter
34	Muna Ali Salem	International Medical University (IMU)	Poster Presenter
35	Nadia Mohamed Yusoff	Universiti Sains Malaysia (USM)	Oral Presenter
36	Naseem Ahmed (Assoc. prof. Dr.)	Indian Institute of Technology Roorkee, India	Oral Presenter
37	Noor Hidayah Pungot	Universiti Teknologi MARA (UiTM)	Oral Presenter
38	Noor Syahira Fauzi	Universiti Teknologi Malaysia (UTM)	Poster Presenter
39	Nooraziah Mohd. Lair	University of Malaya (UM)	Poster Presenter

LIST OF All PARTICIPANTS

No.	Name	Institution	Entitlement
40	Nor Saliyana Jumali (Dr.)	International Islamic Universiti Malaysia (IIUM)	Poster Presenter
41	Noraishah Hamzah	Universiti Teknologi MARA (UiTM)	Oral Presenter
42	Norazah Basar (Dr.)	Universiti Teknologi Malaysia (UTM)	Oral Presenter
43	Norhasliza Bt Kamaruddin	Universiti Teknologi MARA (UiTM)	Poster Presenter
44	Nornadia Jasin	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
45	Norsyafikah Asyilla Binti Nordin	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
46	Nur Aini Azib	Universiti Teknologi MARA (UiTM)	Poster Presenter
47	Nur Amajeida Ismail	University of Malaya (UM)	Poster Presenter
48	Nur Dzaina Zaidel	Universiti Teknologi MARA (UiTM)	Poster Presenter
49	Nurul Izzaty Hassan (Dr.)	Universiti Kebangsaan Malaysia (UKM)	Poster Presenter
50	Nurul Izzati Abd Wahid	Universiti Teknologi Malaysia (UTM)	Poster Presenter
51	Nurul Syafiqah Rezali	Universiti Teknologi MARA (UiTM)	Oral Presenter
52	Nurul Syazana Hasmaruddin	Universiti Sains Malaysia (USM)	Oral Presenter
53	Nurul Zawani alias	Universiti Kebangsaan Malaysia (UKM)	Oral Presenter
54	Nyotia Nyokat	Universiti Teknologi MARA (UiTM)	Oral Presenter
55	Puvaneswari Marappan	International Medical University (IMU)	Poster Presenter
56	Rabuyah Ni	Universiti Teknologi MARA (UiTM)	Poster Presenter
57	Raghavendra Sakirolla (Dr.)	International Medical University (IMU)	Poster Presenter
58	Ramu Meesala (Dr.)	International Medical University (IMU)	Poster Presenter
59	Rubaiyi M. Zaid	Universiti Malaysia Pahang (UMP)	Oral Presenter
60	Ruwaida Asyikin Abu Talip	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
61	Sabahat Sardar	Universiti Teknologi PETRONAS,	Oral Presenter
62	Shafida Abd Hamid (Dr.)	International Islamic University Malaysia (IIUM)	Oral Presenter
63	Shajarahtunnur Jamil (Dr.)	Universiti Teknologi Malaysia (UTM)	Oral Presenter
64	Siti Aishah Hasbullah (Dr.)	Universiti Kebangsaan Malaysia (UKM)	Oral Presenter
65	Siti Noor Hajar Zamrus	Universiti Malaysia Pahang (UMP)	Oral Presenter
66	Siti Nurhazlin Jaluddin	Universiti Teknologi MARA (UiTM)	Poster Presenter
67	Sreenivasa Rao Sagineedu (Dr.)	International Medical University (IMU)	Poster Presenter
68	Tan Joe Jen	International Medical University (IMU)	Poster Presenter
69	Tan Kaishin	International Medical University (IMU)	Non-presenting participant
70	Tasya Ezzati Busrah	Universiti Malaysia Sarawak (UNIMAS)	Oral Presenter
71	Yean Kee Lee (Dr.)	University of Malaya (UM)	Poster Presenter
72	Yeun-Mun Choo (Dr.)	University of Malaya (UM)	Poster Presenter
73	Yoshiyuki Uruma (Assoc. Prof)	National Institute of Technology, Yonago College, Japan	Oral Presenter
74	Zuhair Jamain	Universiti Sains Malaysia (USM)	Poster Presenter

Abstract of Plenary Speakers

"from fundamental research to industrial applications"

Fortynine Years on Natural Product Chemistry

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The natural product chemistry has been dramatically developing in the last several decades since it originally searched for the new structures showing biologically important activity. When the author was young in 1970-1980, the natural product chemistry started to separately develop into the structural study and synthetic study. Some people devoted into the new physical methods; thus, chromatography, NMR- MS-spectroscopy, CD/ORD, X-ray crystallography, etc. inducing developments of the modern spectroscopic machines. At the earlier time, people engaged in the organic synthesis of the natural product to confirm the stereochemistry or challenging problem as target oriented synthesis. Around the next period of 1980-2000 natural product chemistry further developed as more biological aspects such as bioorganic chemistry and biosynthesis utilizing molecular biology as additional tool. Organic synthesis kept going with new methodology for the acyclic stereocontrol, catalytic organic reactions, asymmetric synthesis, etc. In the 21 century natural product chemistry has even expanded by developing a new field 'chemical biology' to search the target protein. It made it possible to observe the dynamic aspects of natural compounds in the living cells. Organic synthesis fields have developed into highly specialized area such as material sciences, medicinal chemistry, green chemistry, and more applied fields. The natural product chemistry has been contributing to the development of multidisciplinary molecular sciences.

Typical subjects of the authors' works for the last forty years are to be classified into structural, synthetic, and bioorganic studies. But most of these are tightly bound at the background base sciences. The first subject is the 'insect diapause' using silkworm diapause eggs to include the isolation, elucidation of the Diapause Hormone, which induces the eggs to arrested-embryonic development. Each egg terminates the diapause and hatches after overwintering by a genetic control as well as the Timer Protein. We have elucidated the molecular mechanism of the time-interval measurement during the diapause termination.Bioluminescence is of significant chemistry exhibiting 'light' as a result of chemical reaction happening in luminous organ of various host organisms. The authors' studies on *Symplectoteuthis* bioluminescence are the first example to form a covalent bond between the chromophore (dehydrocoelenterazine) and the protein *symplectin*. Contribution to elucidate the molecular mechanisms included the synthesis of labeled substrates (100% ^{13}C) or analogs. Finally we come up with the stage that the stereochemistry only emerging on the protein surface plays indispensable role for luminescence.

Chemical synthesis of the natural products provides us a great opportunity to examine the idea of molecules. The authors have achieved the total synthesis of vernolepin, maytansine, okadaic acid, tautomycin, ciguatoxin, and tetrodotoxin as the challenging problems. Unique results to such challenges have been rewarded by new concept of stereocontrol on the basis of the substrate conformation, stereoelectronic factor, metal chelation strategy, enantio-switching reaction starting from D-glucose, etc. *Necessity is the mother of invention*. The target orient synthesis needs a lot of reactions and concepts along the line of multistep synthesis.

Some of these examples will be discussed including recent results.

Enantioselective Synthesis of Natural Products from α-Heteroacetic Acids

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The synthesis of chiral α-hetero acids remains a highly attractive field in organic synthesis because not only are these compounds valuable building blocks, but also they are important biological systems and are key fragments of many antibiotics. Recently, the importance nonproteinogenic amino acids has drawn much attention, due to their applications in tl interdisciplinary field of biology, biochemistry and medicinal chemistry. Accordingly, it is of gene interest in developing an effective and practical procedure to access optically pure α-branch amino acids. Although the recently developed catalytic asymmetric α-alkylation of glycir derivatives catalyzed by chiral phase transfer catalysts is emerging as a promising method synthesizing optically active α-amino acids, asymmetric enolate alkylations of chiral glycinates a still the basis of one of the most commonly employed procedures for synthesizing α-amino acid Enantioselective syntheses of optically active compounds from glycine and glycolic acid employir (1*S*)-*N*,*N*-disubstituted- 10-camphorsulfonamide or ketopinic amide as chiral auxiliaries will b discussed. Application of the resulting products to the enantioselective synthesis of biological active compounds will also be presented.

Keywords: Enantioselective synthesis; Alkaloids synthesis; α-Hetero acids; Natural product.

Abstract of Invited Speakers

"from fundamental research to industrial applications"

Some Examples of Design and Synthesis of New Solid Catalysts

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In this fast changing time, the development of high performance and conceptually innovative catalytic processes is crucial for chemical industries. The purpose of this presentation is to introduce several designs of heterogeneous catalytic systems. These systems comprised of examples from researches that were carried out by the author together with his colleagues and students at Universiti Teknologi Malaysia (UTM). The aim is to develop and understand the catalytic phenomena through the design and physicochemical properties of the solid catalysts. mechanistic features are well understood. Here, an attempt will be made to introduce several catalysts' systems in order to design a better catalyst through chemical design. The catalytic reactions that will be discussed are the oxidation and acid catalysis by heterogeneous catalysts. These works are classified into six classes, namely phase-boundary catalysis, acid catalysis, oxidation catalyst, bifunctional catalyst, photocatalyst, and shape controllable synthesis of solid catalyst-assisted by the magnetic field.

Synthesis and In Silico Studies of Chalcone Derivatives and its Potential as Dengue Virus Inhibitor

Noviany[3], Maywan Hariono[2], Mohamed Sufian Mohd Nawi[3], Ezatul Ezleen Kamarulzaman[3], Eugene Boon Beng Ong[4], Hasnah Osman[1*], Habibah A. Wahab[2]

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A series of chalcone derivatives was synthesized chalcone derivatives were synthesised and evaluated for DENV2 NS2B/NS3pro inhibitory activity. The synthesis were carried out by reacting a diverse *O*-alkylation of *p*-hydroxyacetophenone with different substituted aromatic aldehydes in 50 to 90 % yields. The synthesized product was characterized by FTIR, NMR, X-ray crystallography and elemental analysis (CHN). Remarkable, all the compounds show more virtually active through molecular docking studies towards Wilchapong homology model of dengue virus type-2 NS2B-NS3 protease with free energy binding (FEB) range from -6.68 kcal/mol to -11.66 kcal/mol. Molecular modeling simulation, disclosed the binding interactions of the most active compounds to the active site residues of their respective enzymes. *In vitro* studies, showed good correlation between docking simulation and inhibitory activities towards NS2B-NS3 dengue protease with IC_{50} value 16.18 μM and 71.23 μM respectively.

Keywords: Dengue virus; Chalcone; Protease inhibitor; Molecular modelling.

Synthesis of Bioactive Flavonoid and Chalcones Derivatives

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Flavones constitute one of the most common classes of natural flavonoids which is based on the backbone of 2-phenylchromen-4-one (2-phenyl-1-benzopyran-4-one). Several natural and synthetic derivatives are responsible for a great variety of biological and pharmacological activities. One of the way to synthesise chromones and flavones is through the Baker-Venkataraman rearrangement. Here, we discuss a modified 1-pot synthesis of flavone derivatives through the Baker-Venkataraman rearrangement reaction.

In another topic, moraceous plants are a rich source of isoprenoid-substituted phenolic compounds, in particular the so-called mulberry Diels-Alder-type adducts isolated from the mulberry tree. These naturally occurring mulberry Diels-Alder adducts contain cyclohexene rings and are the first examples of natural products biosynthesized by an enzyme-controlled intermolecular Diels-Alder reaction between a dehydroprenylphenol diene derived from an isoprenoid substituted phenolic compound and an alkene of a chalcone as the dienophile. Here, we describe the total synthesis of some of the mulberry Diels-Alder adduct such as Kuwanon V and Murasabanol A.

Therapeutic *In Vivo* Synthetic Chemistry: Synthesis of Bioactive Molecules in Live Animal

Katsunori Tanaka[1,2,3]

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Through a concept we refer to as "Therapeutic *In Vivo* Synthetic Chemistry", we aim to develop an adaptable system where a cascade of organic transformations can be directly executed at target regions within the body during predefined times to generate a bioactive molecule that elicits a localized biological effect. Towards this goal, we are analyzing, with the use of molecular imaging, the complex "pattern recognition" mechanisms of natural glycans *in vivo* and applying the glycan-based interactions to direct various linked biomolecules to desired organs and tissues.

Our research has introduced various glycan structures onto proteins, dendrons, and live cells, through the 6π-azaelectrocyclization protocols (now referred as RIKEN CLICK reaction), as a means to investigate glycan dependence on *in vivo* dynamics. Through the use of molecular imaging, results have shown that glycan composition on these templates can directly control accumulation towards specific organ and cancer cells, as well as affect their excretion profiles.

We are ultimately challenging to develop a model system where bioactive compounds can be synthesized within living animals, i.e., "Therapeutic *In Vivo* Synthetic Chemistry". Our preliminary challenge will be discussed in this symposium.

Keywords: Azaelectrocyclization; Glycan; *In vivo* synthesis; Molecular imaging.

Sulfur Atom Transfer (SAT) Reaction

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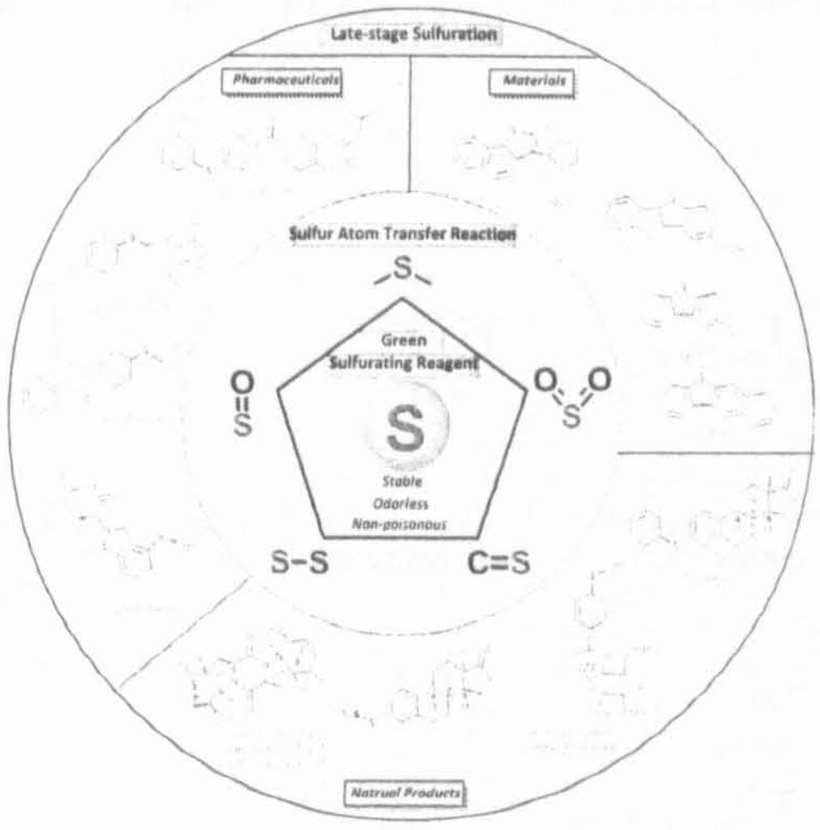
Thiols, as common sulfurating reagents, have numerous drawbacks, such as metal poison unpleasant odor, and apt oxidation, which impede their applications. To overcome th disadvantages, inorganic sulfur sources have been successfully used for introducing sulfur at We show here efficient and mild methods for constructing various C-S, S-O, and C=S bonds un metal-catalyzed or photo-catalyzed conditions. Those convenient C-S bonds constructing reacti are excellent strategies for drug late stage sulfuration and unsymmetric material compou synthesis. When sodium sulfinates were introduced into the sulfur atom transfer system, S-S bo were formed, which would be applied in the total synthesis of natural produ (Epidithiodiketopiperazine), such as Epicoccin A, C, D bearing S and S-S bridge. Oxygen has same outermost electron as sulfur. The corresponding atom transfer reactions have also be investigated, in which the traditionally inactive oxygen source were utilized, such as O_2, H_2O, *etc.*



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ACIE, **2012**, *51*, 12570

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OL, **2016**, *18*, 340

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CEJ, **2014**, *20*, 8308

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CAJ, **2013**, *8*, 2546

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Keywords: Sulfur atom transfer; Sulfidation; Persulfidation; Sulfoxidation, Thiocarbonylation.

The Advances on Diene- Metal and Rh/Cu Catalyzed Enantioselective Reaction

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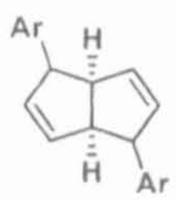
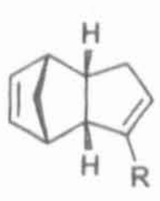
There are a great number of privileged structural subclasses found in a broad range of bioactive molecules as well as chiral ligands for asymmetric catalysts. Over the past decade, we have been engaging in the construction of these targets through asymmetric C–C bond formation reactions. Although various advanced strategies have been dedicated to these scaffolds, their constructions in an efficient and highly stereoselective manner remain challenging. This presentation summarizes our recent developments towards this goal, especially focusing on the design and synthesis of new chiral diene ligands bearing bicyclo[3.3.0] octadiene (**1**) or dicyclopentadine (DCP, **2**) scaffolds and their successful applications in Rh- and Pd-catalyzed reactions.

More recently, a Rh/Cu–catalyzed asymmetric cyclization of *meso*-1,6-dienynes and allene cyclopentadione were realized with high efficiency, providing optically enriched *cis*-hydrobenzofurane (**3**), *cis*-bicyclo[4.4.0]decane (**4**), tricyclo[5.2.2.$0^{4,9}$]-undecane (**5**), the key frameworks in biologically significant natural products.



1



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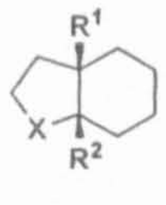
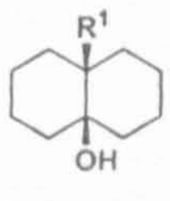


3
X=O, *cis*-hydrobenzofurane
X=NH, CH_2



4
cis-bicyclo
[4.4.0]decane

5 X=O, CH_2
Tricyclo[5.2.2.$0^{4,9}$]
-undecanes

Abstract of Oral Presenters

"from fundamental research to industrial applications"

Polymer Grafted Chitosan for Controlled Release Fertilizer (CRF) Behaviour Study

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Controlled release fertilizers (CRFs) is an advanced way to supply nutrients to plants which improves the usage of fertilizer's efficiency.This research focused on the synthesis of CRFs using chitosan and methacrylate-based polymers as the coating materials and its preliminary CRF behaviour studies. Chitosan is known to be biodegradable in nature that can reduce the accumulation of coating materials in the soil after the release of nutrients. Methacrylate-based polymer is used as the coating material to improve chitosan's rigidity, brittleness and hydrophilic in nature which affects the processability. Reverse Addition-Fragmentation chain Transfer (RAFT) radical polymerization is used to polymerize methacrylate-based polymers into homo and copolymers. Catalyzed-esterification is applied to graft the methacrylate-based polymers onto the chitosan backbone to synthesise grafted chitosan. The synthesised compounds are characterised using NMR, GPC and FT-IR to confirm the monomer's conversion and modifications. The swelling and biodegradability properties of the materials synthesised are determined before it can be used as coating materials in CRFs. The degree of swelling for chitosan is higher than grafted chitosan due to the presence of hydrophobic polymer while the rate of biodegradability of chitosan is higher than grafted chitosan. Therefore, it can be expected that grafted chitosan coating will last longer than chitosan and the nutrient uptake is higher for NPK fertilizers coating with the grafted chitosan.

Keywords: Controlled release fertilizer; Chitosan; Chitisan-*g*-polymer; Swelling.

Synthesis, Characterization and Antibacterial Activity of Hydrazone Schiff Base Compounds and Their Derivatives

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Biological activities (e.g.antibacterial) of hydrazone compound have received much attention in recent years from the synthetic chemists. Herein, we would like to report the synthesis pathways as well as the spectroscopic characterization of four etherified hydrazone Schiff base compounds, which were initiated from (*E*)-*N*'-(1-(2-hydroxyphenyl)ethylidene)benzohydrazide (**2R**) and (*E*)-4-hydroxy-*N*'-(4-methoxybenzylidene)benzohydrazide (**4R**). Hydrazone Schiff base compound **2R** and **4R** were obtained through condensation reaction between 2-hydroxyacetophenone with benzhydrazide and *p*-anisaldehyde with 4-hydroxybenzhydrazide, respectively. Meanwhile the etherified derivatives of hydrazone Schiff base were prepared *via* Williamson ether synthesis under reflux condition. All the synthesized compounds were characterized using GCMS, FTIR, UV-Vis, ^{1}H and ^{13}C NMR spectroscopy. In addition, the antibacterial activities of these compounds were also conducted and the results are discussed in this present paper.

Keywords: Hydrazone Schiff base compounds; Etherified hydrazone Schiff base Compounds; Spectroscopic characterization; Antibacterial activities.

Design & Development of Multifunctional Porphyrin Macromolecules

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Porphyrins are tetrapyrrolic macrocycles; their several metallated, oxidized, and reduced forms are arguably the most significant pigment found in nature. In addition, they possess a variety of impressive functional properties and have also been utilized in a number of natural and artificial systems. Natural porphyrin macrocycles participate in numerous fundamental procedures including oxygen transport and storage, photosynthesis, electron transport, drug detoxification, etc. One of the well-known natural occurring porphyrin is heme, a red color component of hemoglobin, but also found in myoglobin, cytochrome and catalase, serve to the transport or storage of respiratory gases and electron transport. Similarly, chlorins (reduced porphyrins) including chlorophylls convert light into useful energy. Inspired from natural biological significance, synthetic porphyrin macrocycles have attracted great intension and are also investigated for their commercial utilization such as catalytic processes, chelating ligand and also exposed new landscapes of inorganic and organometallic chemistry. The porphyrin macrocycle have the focus of array of studies by chemists, biochemists, and physicist owing to their photo-electronic and electrochemical properties, and hence find many applications in Hi-tech materials, medical treatment, molecular recognition, photosensitizers and photo-catalysts. Currently, due to their photo-electronic and electrochemical properties, the focus is more on the applications of these dyes in photoelectric devices, particularly in dye-sensitized solar cells (DSSCs) and also in medicinal fields, commonly in photodymanic therapy. In this article, various free-based and metallo-multifunctional porphyrin molecules were modeled using different level of density functional theory (DFT) calculations. Absorption wavelength windows and oscillator strengths of these molecules were obtained by the time-dependent DFT (TD-DFT). After detailed computation studies, newly designed porphyrins having desired photochemical porperties were synthesized to compare the experimental data with theoretical results.

Keywords: Porphyrin macromolecules; DFT calculations; Photodymanic therapy; DSSCs.

An Efficient Aldol Reaction Utilizing Novel Prolinamide-Based Organocatalysts in Aqueous Media

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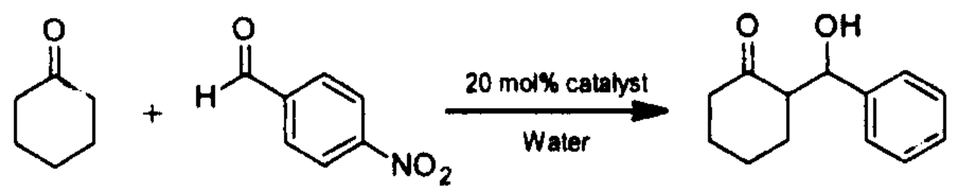
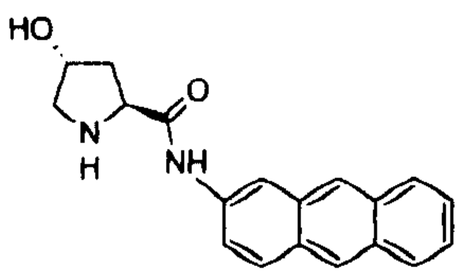
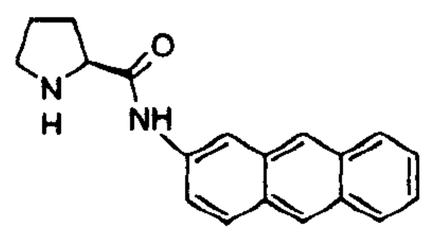
2-Aminoanthracene was selected to produce novel prolinamide-based organocatalysts with L-proline and *trans*-4-hydroxy-L-proline under optimized conditions (93-97% yields). Catalytic potentials of both catalysts were assessed in direct Aldol Condensation reactions between cyclohexanone and 4-nitrobenzaldehyde. Different organic solvents were used to study the solvent effect to generate good yields. Water was found to be the most effective solvent giving the highest yield of 81%. In addition, the catalysts were found to be easily recycled without alteration of their respective structures. Enantioselectivities and diasteroselectivities of the Aldol products formed utilizing the synthesized catalysts are yet to be studied.





catalyst 1



catalyst 2

Keywords: Organocatalysts; 2-Aminoanthracene; L-proline; *trans*-4-hydroxy-L-proline.

Synthesis towards Pachydermin and the Tautomerism of its 3-Acyltetramic Acid Intermediates

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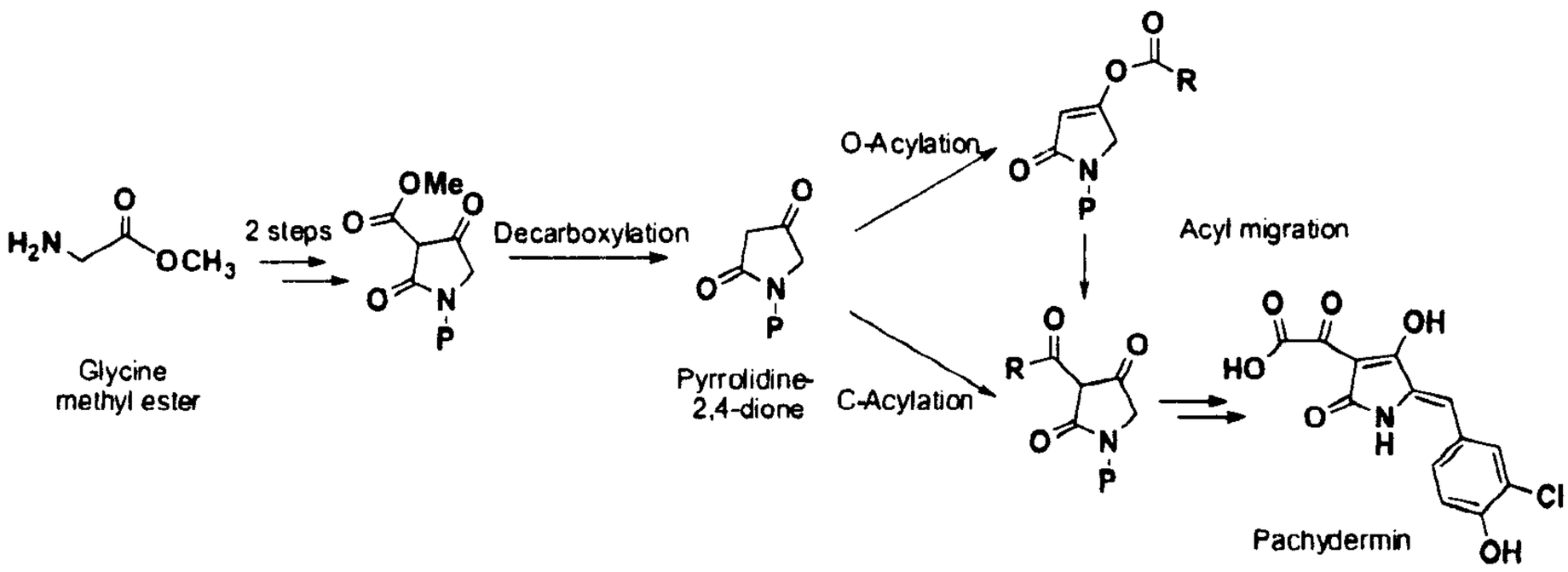
In the synthesis of Pachydermin, a bioactive natural product, a series of 3-acyltetramic acids was generated via O-acylation of pyrrolidine-2,4-dione with different acyl functionalities. Employing different bases which include triethylamine, NaH, t-BuOK, TBAF, pyridine and some of ionic liquids ($BmimBF_4$ and $BmimBF_6$) in different reaction conditions gave only the enol esters. The key step to furnish the required natural compound is the acyl migration of the enol esters to their respective 3-acyltetramic acid analogues using potassium cyanide in acetonitrile and triethylamine. Subsequently different alkyl groups at C-3 position and alkene functionalities at C-5 position were introduced using different alkyl or aryl aldehydes. The structures of all synthesized compounds were fully complied with their respective spectroscopic data (^1H & ^{13}C NMR and FTIR).



Keywords: Pachydermin; Pyrrolidine-2, 4-dione; 3-Acyltetramic acid; *O*-acylation.

Synthesis and Biological Properties of Aspirin bearing Phenyl Thiourea Moiety

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Paul Matthew Neilsen[3], Hwang Siaw San[3]

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The study is on the modification of aspirin *via* incorporation with thiourea moiety. Acetylsalicyloyl chloride was reacted with KSCN and series of halogenated anilines to form 12 aspirin derivatives. All the synthesised compounds were characterised using CHN elemental analysis, FTIR, ^{1}H-NMR and ^{13}C-NMR spectroscopy. All aspirin derivatives showed excellent antibacterial activity against *E. coli* compared to standard drug, ampicillin and promising anticancer activity on nasopharyngeal cancer cell lines HK1 in comparison to the standard chemotherapeutic drug, 5-fluorouracil.

Keywords: Aspirin; Thiourea; Antibacterial activity; Anticancer activity.

Synthesis and Molecular Docking of Carvone Derivatives as potential Neuraminidase Inhibitors

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Recent outbreaks of highly pathogenic and occasional drug-resistant influenza strains have highlighted the need to develop novel anti-influenza therapeutics. Here, we design, synthesized, and report computational analysis of carvone derivatives as potential neuraminidase inhibitors. A series of carvone derivatives were synthesized by following a four-step synthetic strategies. All isolated compounds obtained were elucidated using ^{1}H NMR and ^{13}C NMR analyses. Docking studies were performed using AutoDock 3.0.5 to study the interactions of the neuraminidase (NA) with the ligands. Based on docking analysis, compound 3 was found to interact better in NA active site compared other compounds with the lowest free energy binding of -7.39 kcal/mol.

Keywords: Neuraminidase inhibitors; Carvone; Docking; Anti-influenza.

One-Pot Multicomponent Syntheses and Characterization by Synthesized Task Specific Protic Ionic Liquids

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Four bronsted acidic ionic liquids have been synthesized and characterized to catalyze Mannich reaction smoothly at room temperature to afford some Mannich bases in high yield and less reation duration. Ionic liquids have been used as catalyst as well as solvent. Work up has been facilitated by simple extraction with water to recover ionic liquid for recycling upto four times without any significant loss in activity.

Keywords: Mannich bases; Bronsted acidic ionic liquids; 1-Methylimidazole; 1,3-Propane sultone.

Small Molecules with Potential Biological Activities

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[1]Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak 26300, Kuantan Pahang, Malaysia

[2]Institute of Bioscience,[3]Department of Cell and Molecular Biology, Faculty of Biotechnology and Biomolecular Science, Universiti Putra Malaysia, 43400 Serdang, Selangor Darul Ehsan, Malaysia.

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Natural products are unique source for drugs discovery. Several small molecules such as anthraquinones flavokawain B and curcumin related compounds exhibited tremendous biological activities. Curcumin and related compounds containing 1,3-diketone moiety, which is also essential biological activities possessing various pharmacological activities such as anti-cancer, anti-inflammatory, anti-oxidant and anti-diabetic properties. Various naturally occurring compounds have been synthesized and investigated for their cytotoxic properties against breast cancer cell lines MDA-MB231 cells. A series of mono-carbonyl curcuminoids analogs have been synthesized by Claisen Schmidt condensation reaction by using acid or base catalysed reaction. Various analogues especially 2,6-*bis*(4-bromobenzylidene)cyclohexanone, 1,5-*bis*(4-hydroxy-3-methoxyphenyl) penta-1,4-dien-3-one and 1,5-*bis*(2,5-dimethoxyphenyl)penta-1,4-diene-3-one showed the potential anticancer activity. Together, these results some natural compounds isolated from *Knema laurina* showed acetylcholinesterase inhibitory activities. The compounds were purified by column chromatography and their structures were determined by ^{1}H NMR, GC-MS, and single X-ray analysis techniques.

Keywords: Anthraquionones; Curcuminoids; Alpha glucosidase; Acetylcholinesterase inhibitors.

Synthesis, Characterization and Physical Properties of Carbazole Dendrimers as Blue Host Materials for Organic Light-Emitting Diodes

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Organic light-emitting diode (OLEDs) has been attracting much attention recently for their promising applications in energy-efficient flat-panel displays and for the next generation solid state lighting. Our present lighting system such as tungsten filament bulbs and fluorescent lamp consume more power, harmful, non-disposable and have short lifetime. The development in OLEDs could solve this problem because it is self-illuminating, eco-friendly and power saving technology. Furthermore, OLEDs are thin and light, flexible, varying in shapes, colors and sizes and some are even transparent. Currently, the design of suitable host materials for the efficient and stable blue OLEDs still remains a challenge due to the requirement of high triplet energy. In order to achieve that, carbazole moiety was chosen in our study because carbazole-based host materials have high triplet energy and excellent hole-transporting properties for blue OLEDs. To serves as good host for OLEDs, the materials should fulfill some requirements: suitable ionization potentials, high electron mobility, permit formulation of uniform films without pinholes, morphologically stable and thermally stable. Therefore, we have synthesized several novel dendritic carbazole-based molecules with high molecular weight (more than 1700 g mol^{-1}). These dendrimer molecules have the ability to form good quality film, well-defined structure, high level of purity and good solubility in common solvents.

Figure 1. Molecular structure of **ZAH-3** and **ZAH-4**

Two type of carbazole dendrimers were successfully synthesized in six steps. The key reaction in the synthetic pathway is The Ullman coupling reactions. The dendrimers, namely 4,4'-bis(3,6-bis(3,6-ditert-pentyl-carbazol-9-yl)carbazol-9-yl)-2,2'-dimethylbiphenyl (**ZAH-3**) and 4,4'-bis(3,6-bis(3,6-ditert-pentyl-carbazol-9-yl)carbazol-9-yl)biphenyl (**ZAH-4**) (Fig.1) were isolated in moderate yield (60%) after purified by column chromatography and recrystallization. **ZAH-3** and **ZAH-4** were fully characterized by NMR, FTIR, MALDI-TOF mass spectroscopy and CHN analysis.

Keywords: Organic light-emitting diodes (OLED); Blue host materials; Carbazole dendrimers; Triplet energy.

Synthesis of Novel Enamines Series of 2-Oxo-4-carboethoxy-5-aryl-3-aminopyrrolidine as Potential New Anti Microbial Agents

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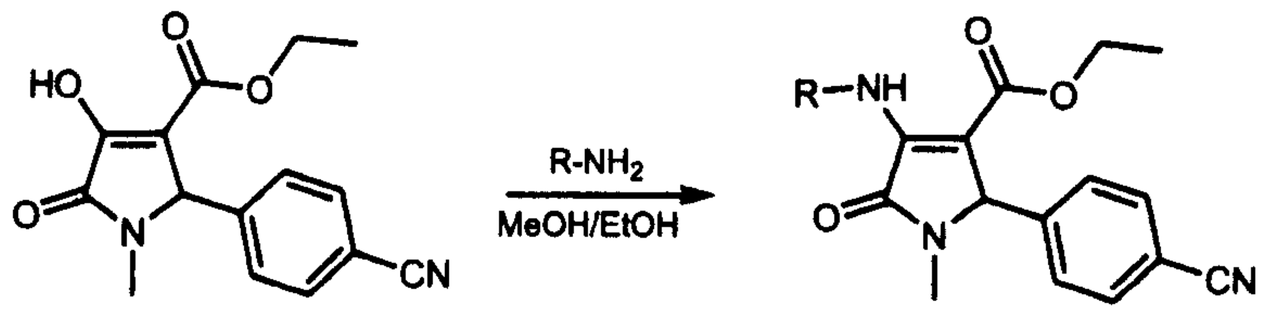
An efficient and straightforward procedure for the synthesis of novel series enamines of 2-oxo-4-carboethoxy-5-aryl-3-aminopyrrolidines (**2a-g**) is being described here. The title compounds, (**2a-g**) were synthesized *via* reductive amination of various amino acid ester and amine salts with the one-pot product of 2,3-dioxo-4-carboethoxy-5-arylpyrrolidines (**1**) in refluxing condition. The structures of all the synthesized compounds were confirmed by IR, ^{1}H NMR and ^{13}C NMR spectra and currently being subjected to anti-microbial study.



1 **2a-g**

R:a) CH_2COOCH_3; b) $CH_2COOCH_2CH_3$; c) $CH_3(CH)COOCH_3$; d) $CH_2C_6H_4(CH)COOCH_3$; e) $(CH_3)_2CH(CH)COOCH_3$; f) $CH_2C_6H_4NO_2$; g) $C_{10}H_7$

Keywords: Pyrrolidine; Aminopyrrolidine; Amino acid ester; Reductive amination.

Synthesis and Characterization of 1,4-Phenylenediamine Derivatives Containing Hydroxyl and Cyclotriphosphazene as Terminal Group

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A series of compounds with two Schiff base linking units and four different substituents (heptyl, dodecyl, methoxy and chloro) have been successfully synthesized. Further reactions form new monosubstituted cyclotriphosphazene based molecules with different substituents. These compounds were characterized using FT-IR (Fourier Transform Infrared); 1D NMR (Nuclear Magnetic Resonance) of ^{1}H, ^{13}C, DEPT 90 and DEPT 135; 2D NMR of COSY (^{1}H-^{1}H) and HMQC (^{1}H-^{13}C) and CHN elemental analysis. The transition mesophase(s) of these compounds were determined using POM (Polarized Optical Microscope) and DSC (Differential Scanning Calorimetry). Two compounds with heptyl and dodecyl substituents were found to be mesogenic with smectic C phases while monosubstituted cyclotriphosphazene compounds of the same substituents (heptyl and dodecyl chains) were also found to be mesogenic. Cyclotriphosphazene compounds with heptyl chain shows smectic C and nematic phases while compound with dodecyl chain shows only the nematic phase. However, compounds with methoxy and chloro substituents were found to be non-mesogenic.

Keywords: Cyclotriphosphazene; Schiff base; Nematic; Smectic C.

Novel Biantennary Glycolipids for Targeting Vesicular Delivery Systems

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Carbohydrates are among natures most abundant resources, commonly associated with energy storage on the one hand and skeletal functions, e.g. in plants and insects, on the other. Moreover, they resemble key components in intercellular interactions, including the immune system. The carbohydrate-mediated differentiation of blood groups demonstrates this nicely. Typically intercellular functions are mediated through complex molecules comprising of the carbohydrate and a protein or lipid. These compounds are commonly termed as 'glycoconjugates'. Glycolipids, which represent conjugates with a lipid component, are frequently found in cellular membranes, where they also contribute to the vital barrier between the cell-interior and its aqueous environment.

Owing to the abundance of carbohydrates in renewable resources, glycolipids are interesting base material for vesicular drug delivery systems. The latter can be described as miniature cell-like assemblies of surfactants, which enable a temporary encapsulation of a drug, thus potentially preventing harmful side effects. However, for optimum use of the protective shield a vesicular delivery system requires a targeting device. For this, specific interactions of cellular surface antigens with complementary receptors can be targeted. This differentiation of cells is the foundation of the immune system and forms the basis of the medical vaccination concept.

Unlike a vaccination, where the immune system builds up the targeting defense, a receptor-based drug delivery system requires larger quantities of the antigens. Owing to the resulting costs, an efficient usage of the latter is vital. In order to achieve this target, our research aims for a coupling of prepared drug carriers with a targeting antigen at the last stage. This requires chemically modified glycolipids with coupling functionality. We hereby present the design of suitable compounds and their chemical multi-step synthesis.

Keywords: Carbohydrate surfactants; Functionalized glycolipid; Vesicle; Drug delivery.

An Asymmetric Approach for the Synthesis of γ-Lactone-γ-Lactam as an Advanced Intermediate towards Omuralide Derivatives

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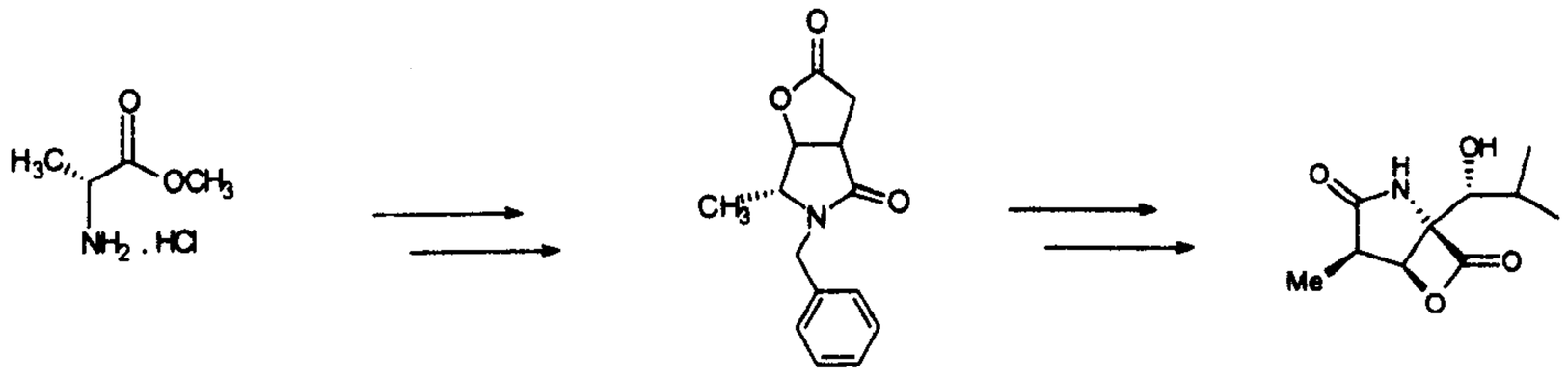
An asymmetric approach towards the synthesis of 3,4-fused γ-lactone-γ-lactam in diastereomeric mixtures from chiral D-alanine methyl ester hydrochloride is hereby described. *Via* eight synthetic steps which include various chemical transformations and functional group interconversions, the key step of lactonization with many different reagents are highlighted. In addition, this bicyclic moiety will serve as an advanced intermediate towards omuralide isomers and derivatives especially as potential proteasome inhibitors.



Keywords: 3,4-Fused γ-lactone-γ-lactam; Lactonization; Omuralide; Bicyclic moiety.

New Bisthiourea Derivatives with Amino Acid Side Chain Linkers and Their Binding Behavior with Selected Metal Ions

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In this study eight new symmetric bisthiourea derivatives with two different spacers (Terephthaloyl and Isophthaloyl) and four amino acid side chain linkers (L-Glycine, β-Alanine, L-Phenylalanine and L-Leucine) were synthesized with good to moderate yield. The derivatives were characterized by FTIR, ^{1}H-NMR, ^{13}C-NMR, Elemental analysis and ESI-MS. The characterization data was found to be in agreement with the expected bisthiourea derivatives. Furthermore binding behavior of two of the newly synthesized bisthiourea derivatives was studied using UV-Vis against various metal ions(Ag+, Al3+, Cu2+, Co2+,Cd2+, Ni2+, Zn2+, Mn2+, Mg2+, Ca2+, Sn2+, Hg2+, Pb2+, Fe2+, Fe3+,Na+). The results showed both the ligands had strong affinity towards Ag(I), Cu(II), Ni(II), Hg(II), Pb(II), Fe(II) and Fe(III) metal ions, while rest of the ions showed no significant interaction with the ligands. Sensing study of ligands, against the metal ions was investigated using continuous variation titration experiments.

Keywords: Bisthiourea; Amino acids; Binding behavior; Metal ions.

Synthesis of Hydroxylated Coumarinyl Chalcones As Potential Antioxidant Agents

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Two hydroxycoumarins known as 3-acetyl-7-hydroxycoumarin and 3-acetyl-6-hydroxycoumarin had been successfully synthesized in high percentage of yield using the Knoevenagel condensation method with piperidine as the catalyst and glacial acetic acid as the co-catalyst. Three novel coumarinyl chalcones were produced from the reaction of these coumarins with hyroxylated benzaldehyde using the Claisen-Schmidt condensation method in the presence of Lewis acid/BF_3-Et_2O. These coumarinyl chalcones were identified as 7-hydroxy-3-[3-(4'-hydroxyphenyl)prop-2-enoyl]-2*H*-1-benzopyran-2-one, 6-hydroxy-3-[3-(4'-hydroxyphenyl)prop-2-enoyl]-2*H*-1-benzopyran-2-one and 7-hydroxy-3-[3-(3',4'-dihydroxyphenyl)prop-2-enoyl]-2*H*-1-benzopyran-2-one. The antioxidant activities of the synthesised compounds were evaluated using DPPH, ABTS and FRAP assays. The coumarinyl chalcones exhibited significant antioxidant activity compared to the hydroxycoumarins. 7-Hydroxy-3-[3-(3',4'-dihydroxyphenyl)prop-2-enoyl]-2*H*-1-benzopyran-2-one exhibited the highest antioxidant capacity with SC_{50} values of 0.57 mM and 0.036 mM in the ABTS and DPPH assays respectively. The FRAP value of the coumarinyl chalcone falls between 0.09 mM to 1.67 mM which is comparable with the positive control, butylated hydroxyanisole (BHA).

Keywords: Coumarinyl chalcone; Hydroxycoumarin; Knoevenagel; Claisen-Schmidt condensation.

Synthesis and Characterization of Diarylheptanoids

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Curcumin is one the lead compounds extracted from the rhizomes of *Curcuma longa* and has been reported to show various pharmacological activities such as anti-cancer, anti-inflammatory, anti-oxidant and anti-diabetic properties. In the present studies, a series of mono-carbonyl curcuminoids analogs have been synthesized by Claisen Schmidt condensation reaction by using acid or base catalysed reaction with different substituted aldehydes and different ketones. Various analogues especially 2,6-*bis*(4-bromobenzylidene)cyclohexanone, 1,5-*bis*(4-hydroxy-3-methoxyphenyl)penta-1,4-dien-3-one and 1,5-*bis*(2,5-dimethoxyphenyl)penta-1,4-diene-3-one showed the potential anti-cancer activity. The compounds were purified by column chromatography and crystallization with methanol. The structures of all compounds were determined by ^{1}H NMR, GC-MS, and single X-ray analysis techniques. These compounds exhibited potential cytotoxic properties against breast cancer. The finding of novel results will be presented in the conference.

Keywords: Curcumin; Curcuminoids; Breast cancer; X-Ray analysis.

Chemical Explorations Of Pyrrolidine-2, 3-Dione: Friedländer, Curtius Rearrangement And Acyl Hydrazide Reactions

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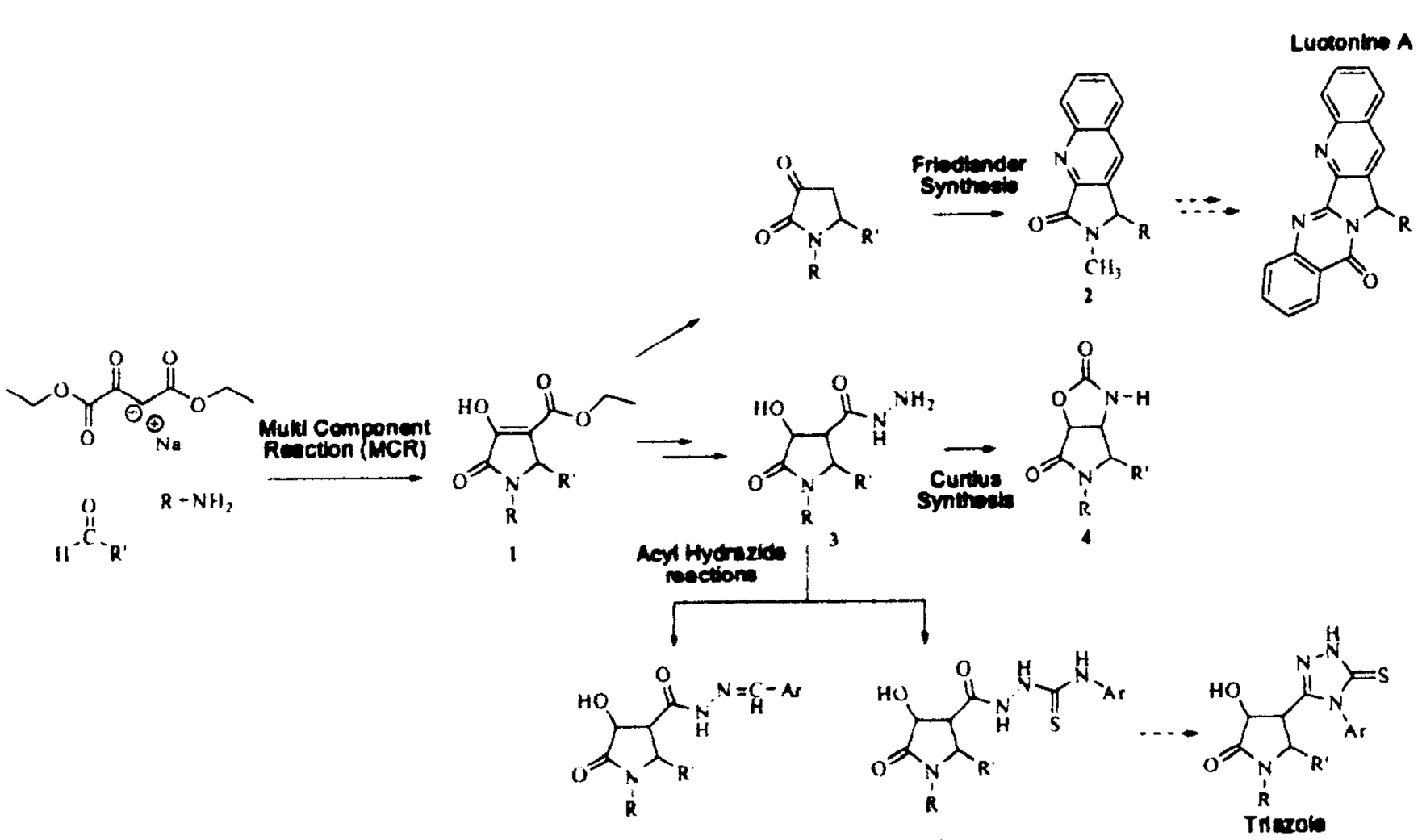
Pyrrolidine-2, 3-dione **1** is a key skeleton used for the synthesis of many important alkaloids which include mescaline isocitrimidelactone, salinosporamide A and codonopsinine. Compound **1** can easily be prepared *via* a one-pot multicomponent reaction (MCR) utilizing Daehen's protocol. The highly functionalised **1** was then subjected to a series of chemical transformations to produce new heterocyclic molecules. For example decarboxylation of compound **1** gave a 2,3 diketo compound which further undergoes the Friedlander condensation to give product **2**, a key intermediate found in a cytotoxic alkaloid, Luotonine A. Similarly, the formation of acyl hydrazide derivatives **3** from **1** followed by Curtius rearrangement gave a novel bicyclic 3,4-fused-2-oxazolidinone-γ-lactam **4**. Compound **3** was also treated with aryl aldehyde and isothiocyanate giving azomethine **5** and thiosemicarbazide **6**, respectively. Further elaboration of the thiosemicarbazide **6** can leads to the formation of new pyrrolidine triazole type compounds.



Keywords: Pyrrolidine-2, 3-dione; Friedlander condensation; Curtius rearrangement; Acyl hydrazide.

Synthesis of 3-(*p*-Amino phenyl)-5-furyl-1,2,4 triazole and Evaluation of Its Potential for the Treatment of Gram-negative Bacterial Sepsis

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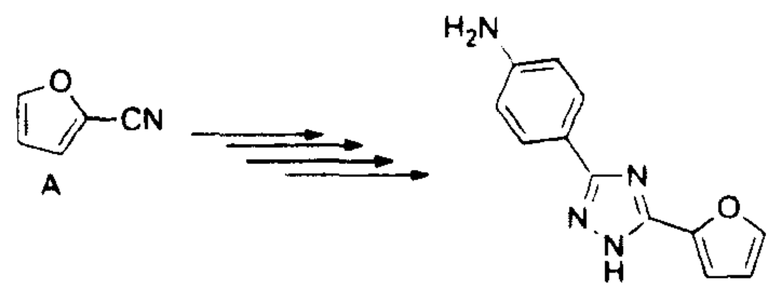
Gram-neagive bacterial sepsis refers to symptomatic bacteraemia, caused by gram-negative bacteria, with or without organ dysfunction. In an attempt to discover new drug-like compounds, we have synthesised a compound containing three important pharmacophores; aniline, 1,2,4 triazole and furan. All these pharmcophores are known to exhibit antibacterial and anti-inflammatory properties. The target compound, 3-(p-aminophenyl)-5-furyl-1,2,4-triazole, was synthesised.



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The compound has shown promising antimicroibal activity against gram –ve referernce strain and multi-drug resistant clinical isolates of *Acentobacter baumanii*. The compound's MIC was found to be in the range of 0.5 to 20 μM against various isoaltes. The compound also has shown potent anti-inflammatory activity in Greiss assay using mouse macophages, RAW 264.7 cells. It's IC_{50} value was found to be around 10 μM. In silico studies has suggested that this compound is targetting CTX-M-9 β-lactamase in eliciting antibacterial activity while it is targetting TLR-4/MD-2 dimersiation in eliciting anti-inflammatory activity. These results are suggesting this compound has potential to be further studied for its efficacy in the treatment of bacterial sepsis.

Keywords: Furan;1,2,4-triazole; Aniline; Antimicrobial; anti-inflammatory; Sepsis.

Synthesis and *In-silico* Studies of Some Novel Benzimidazole Derivatives

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Benzimidazole nucleus is a bicyclic heterocycle containing benzene and imidazole scaffold. It is an important pharmacophore and a privileged structure in medicinal chemistry eliciting biological responses similar to purines. Benzimidazole derivatives has attracted the attention of synthetic organic chemists because of their highly pronounced biological activities such as antiviral, antitumor, antifungal, antihistamine and anti-inflammatory. Encourage by these observations and in continuation of our research program on the synthesis of heterocyclic compounds, we report herein the synthesis of some new benzimidazole derivatives. The compounds were synthesized in a four steps starting from 4-fluoro-3-nitrobenzoic acid under relatively mild reaction conditions. The structures of all the synthesized compounds were characterized by ^{1}H NMR and ^{13}C NMR. Molecular docking studies are dominant *in silico* tools for exploring ligand-receptor interactions to hypothesize the drugs modifications. Therefore, the potential compounds were evaluated preliminary through the molecular docking studies.

Keywords: *In-silico*; Heterocylic; Benzimidazole derivatives; Molecular docking.

Synthesis, Characterization and *In-Silico* Studies of Dispiropyrrolidine Derivatives

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Spiro-compounds are widely used in the field of medicines and drugs because of its characteristic tetrahedral spiro-linked carbon which rendered important conformational features and structural implications for biological activity. These compounds have been reported to possess diverse pharmacological activities like anticancer, anti-tubercular, anti-malarial and antiviral activities. Thus keeping in view of the importance of spiro compounds in medicinal chemistry, we envisioned the synthesis of a series of spiro-pyrrolidine derivatives using [3+2]-cycloaddition reaction. The structures of all the synthesized compounds were characterized by ^{1}H NMR, ^{13}C NMR and Mass spectroscopy. Docking studies are powerful *in-silico* tools for exploring ligand-receptor interactions to hypothesize the drugs refinements. Thus the potency of designed compounds was predicted through the molecular docking studies.

Keywords: Spiro derivatives; [3+2]-cycloaddition; Piperidone; Molecular docking.

Synthesis and preliminary assessment of antibacterial activity of aaptamine derivatives

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Aaptamines is a group of bioactive compounds isolated from *Aaptos aaptos*, which contains a unique skeleton of 1H-benzo[de][1,6]-naphthyridine. A series of aaptamine derivatives have been synthesized and the chemical structure was characterized on the basis of spectroscopic analysis. The synthesized compounds were evaluated for their antibacterial activity against selected bacterial strains namely *Bacillus cereus, Staphylococcus aureus, Micrococcus* sp, *Escherichia coli, Pseudomonas aeruginosa* and *Klebsiella pneumonia* by using standard microbiological protocol of disc-diffusion and broth microdilution. The antibacterial activities of the compounds were assessed by the inhibition zones and minimum inhibition concentration (MIC) values. Preliminary screening showed that derivatives (**14**, **90** and **131-138**) have significant inhibition activity against *Bacillus cereus, Staphylococcus aureus* and *Micrococcus* sp, with compound **14** and **134** exhibited antibacterial activity against all (100%) of the tested bacteria. Further evaluation by broth microdilution showed the same antibacterial activity as disc-diffusion, where 75% of the synthesized compounds exhibited activity toward Gram positive bacteria. Interestingly, we also found that *Staphylococcus aureus* and *Micrococcus* sp. were inhibited by all synthesized compounds, with MIC as low as 1μg/ml. Collectively, our study demonstrated the potential of aaptamine derivatives for future development in pharmaceutical applications.

Keywords: Aaptos aaptos; Aaptamine; Antibacterial; Disc-diffusion method.

Toward for a synthesis of Keronopsin A_2

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Keronopsins, naturally-occurring self-defense toxin found in marine ciliate *pseudokeronopsis rubra* has known for its chemical deterrent effect on living organism. A written report which describes the peculiar activity of 3-bromoisorumbin against cancer cells of lung and ovarian, is a significance that similar structural feature of keronopsins would probably a remedy. In order to examine the mechanism of the toxin, we began working with the total synthesis of keronopsin A_2. The initial scheme utilizing Stille coupling reaction as a key reaction has a serious matter. In this synthetic plan, each fragments was accomplished by using known method. However these fragments could not be connect. Therefore we demonstrate revised scheme. As a result, pyrone ring containing unsaturated bond was achieve by using weinneb amide strategy. Now, we have been carried out synthesis of mainly skeleton structure of keronopsin A_2.

Keywords: Natural Product; Self defence toxin; Pyrrole; HWE reaction.

Extraction of Betacyanin from *Hylocereus Polyrhizus* Peel : Effect of Operating Conditions

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Betacyanin pigment is red purple colour that can be produced from the peels of *Hylocereus polyrhizus* fruit. The peel of *Hylocereus Polyrhizus* is often regarded as a waste hence this study was aimed to investigate the feasibility of using the peel as natural dye source. Betacyanin extraction was study from this by-product using solvent extraction method in order to identify the preliminary parameters range for different factors.In this research the influence of extraction time, solvent ratio, and solid loading ratio towards the total betacyanin content was studied. The analysis of the total betacyanin content was conducted by means of the absorbance measurement using the UV-Vis Spectrophotometer. The results clearly indicated that betacyanin content was highest at solvent percentage 30%, solid loading ratio at 1:4 and the best extraction time at 60 minutes.

Keywords: Betacyanin; *Hylocereus polyrhizus*; Extraction; Parameter range.

The Synthesis of Water Soluble Polygalacturonic (PGA)-Betulinic Acid and Methoxy Polyethyleneglycol (mPEG)-Betulinic Acid Derivatives

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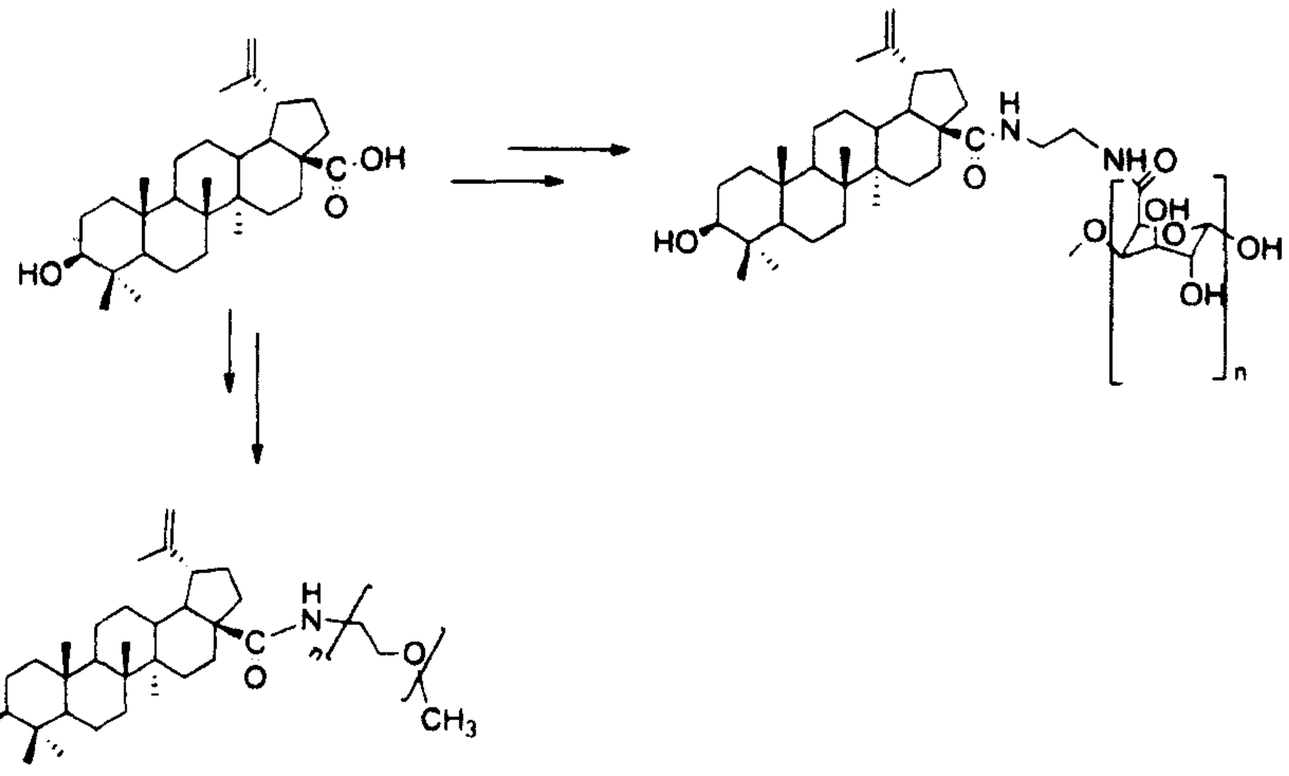
Betulinic acid (BA) is a well-known compound classified as a pentacyclic triterpenes, which has anti-retroviral, anti-malarial, anti-inflammatory properties, antioxidant and anti-cancer activities. However such applications are limited by the poor water or organic solvents solubility of betulinic acid. Herein we report the synthesis of water soluble polygalacturonic-betulinic acid via peptide synthesis method using ethyl diamine as a linker followed by incorporation with BA. The methoxy polyethyleneglycol(mPEG)-betulinic acid was successfully synthesized via Mitsunobu reaction of m-PEG-OH, followed by peptide synthesis reaction with BA.



Keywords: Peptide; Betulinic acid (BA); Polygalacturonic acid (PGA); Poloyethyleneglycol (PEG).

A Class Of Novel 2,9-Bis(Alkylated)-β-Carboline Intercalators: Synthesis, Crystal Structure, In Vitro Anti-Cancer Agents, And Ct-Dna Binding Study

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A series of novel 2,9-bis(alkylated)-β-carbolin-3-ium bromides as potential anticancer agents were designed and synthesized. The structures of these compounds were confirmed by ^{1}H-NMR, ESI mass spectrometry and elemental analysis, as well as single crystal X-ray crystallographic analysis. All the compounds were screened for anti-cancer activity against four human carcinoma cell lines by using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The preliminary binding properties of these series of compounds to calf-thymus DNA (CT-DNA) have been investigated by using UV-vis absorption titration and fluorescence emission studies. Their binding constant (K_b) and the linear Stern-Volmer quenching constant (K_{sv}) have also been determined. The results indicated that all the target compounds intercalate into CT-DNA with high affinity.

Keywords: β-Carbolin-3-ium bromides; Anti-cancer; UV-visible absorption; Fluorescence.

Synthesis, Modification, Characterization and Biological Activity of Hydrazone Schiff Base

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Hydrazone Schiff base compounds have been widely reported regarding its effectiveness in biological activities due to present of azomethine C=N group. In most cases, the structure of hydrazone Schiff base is the main factor in controlling the biological activites. Due to this reason, this study was aimed to modify the structure of hydrazone Schiff base and observed the effect of their biological activity. In this study, two hydrazone Schiff base compounds namely 3-hydroxybenzaldehydebenzhydrazide (**1**) and 3-hydroxybenzaldehyde salicylhydrazide (**2**) were synthesised. Hydrazone Schiff base (**1-2**) were derived from condensation reaction by removing water of 3-hydroxybenzaldehyde with benzhydrazide and salicylhydrazide, respectively. Meanwhile, Williamson etherification method was used to prolong the side chains of parent ligands by addition of C8, C10 and C12 alkyl chains in the compounds. With that, 3-hydroxybenzaldehyde was modified into 3-(octyloxy)benzaldehyde, 3-(decyloxy)benzaldehyde and 3-(dodecyloxy)benzaldehyde before reacting with benzhydrazide(**1a-c**), salicylhydrazide(**2d-f**) in order to form new modification compounds. All compounds were characterised using UV-Vis, FTIR, GC-MS and ^{1}H and ^{13}C NMR spectroscopic. Biological activity of the synthesised compounds and their modification compounds were tested against gram-positive and gram-negative bacteria using *Bacillus cereus* and *Escherichia coli*. All compounds showed a significant increasing growth inhibition on bacteria as the concentration increased. Antibacterial studies also revealed that the hydrazone Schiff base with modification alkyl chain were more effective compared to parent compounds.

Keywords: 3-Hydroxybenzaldehyde; Williamson etherification; Hydrazone Schiff base; Spectroscopic studies.

Ultrasound-assisted Extraction and Characterizations of Pectins from Dragon Fruit (*Hylocereus polyrhizus*) Peels in Various Acid Solution: A Preliminary Study

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The worldwide consumption of pectin was reported about 45 million kilogram per annum. Due to some major demand of pectin in food and pharmaceutical industries, numerous investigations have been carried out to determine the composition of pectin in different plant. A major challenge in developing any new pectin product is to preserve the physicochemical characteristics of pectin. This is due to composition of pectin can vary depending on the plant source and extraction condition. This study was focused on the potential of *Hylocereus polyrhizus* peels (HPP) to be a source of pectin. The extraction of pectin from HPP was carried out using combine method of physical and chemical during extraction. The equipment used was sonicator bath and extraction was carried out in dionized water, organic acid (citric acid, acetic acid) and mineral acid (H_2SO_4, HCl, HNO_3). Pectin obtain from this method was compared in terms of yield, galacturonic acid (GalA) content and degree of esterification (DE). Fourier Transform Infrared Spectroscopy (FTIR) and Ultra Violet-visible spectroscopy (UV-vis) was used in the identification of HPP pectin properties. The yield of HPP pectin range from 33% to 40% with the GalA content from 22% to 40% and DE from 13% to 62%. The highest pectin yield (~40%) with GalA 39% and DE 62% can be achieved when extraction was carried out using citric acid solution. These results suggest that ultrasound-assisted extraction could be a good option for the pectin extraction with citric acid from HPP for industrial scale.

Keywords: Extraction; Fruit pectin; *Hylocereus polyrhizus*; Degree esterification.

Synthesis and Studies of Biological Properties of Dihydropyrimidine-2(1H)-thione Derivatives

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Dihydropyrimidine-2(1H)-thione derivatives have been intensively studied and used as inhibitors for biological activities. In this study, series of dihydropyrimidine-2(1H)-thione derivatives substituted with halogen and long alkyl chain synthesized by condensation reaction of chalcone derivatives with thiourea with overall yield 25-77%. The synthesized heterocyclic compounds were analysed using elemental analysis (CHN), characterized using Fourier Transform Infrared (FT-IR) spectroscopy and Nuclear Magnetic Resonance (^{1}H and ^{13}C NMR). The antibacterial activity of the synthesized dihydropyrimidine-2(1H)-thione derivatives were screened against *Escherichia coli* (ATCC 25922) and *Staphylococcus aureus* by Kirby-bauer disc diffusion method. The synthesized compounds were evaluated for their potential antibacterial activity and result obtained was discussed.

Keywords: Chalcone; Dihydropyrimidine-2(1H)-thione; *E.coli*; *S.aureus*.

Combination of Immobilization Techniques by Entrapment and Covalent Binding on Alginate Hydrogel Beads for Xylanase

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Enzymes serving as biocatalysts and play an important roles in many industrial field. However, the limitation of enzyme usage due to its high cost and unstable conditions of soluble enzyme to harsh conditions lead to findings an alternative to enhance the enzyme efficiency by immobilization (insoluble enzyme). The present work reported a combination of immobilization technique of xylanase by entrapment and covalent binding on alginate hydrogel beads. Xylanase enzyme was effectively immobilized within the alginate hydrogel beads by entrapment and covalent binding on the surface of alginate beads using glutaraldehyde as a cross-linked agent. The effects of immobilization parameters includes of sodium alginate concentration (% w/v), calcium chloride (M), enzyme loading (U) and agitation rate (rpm) were studied in order to obtain a better immobilization yield. These effects were studied using one-factor-at-one-time (OFAT) to obtain the best condition for xylanase immobilization. The analysis of xylanase activity was determined using dinitrosalicyclic (DNS) acid reagent method. Maximal enzyme immobilization yield (>80 %) was achieved at 3.0 % w/v sodium alginate concentration, 0.3 M calcium alginate, and 200 rpm of agitation rate. The study shows the xylanase can be immobilized efficiently by a combination of immobilization techniques by entrapment and covalent binding on alginate hydrogel beads.

Keywords: Xylanase; Immobilization; Entrapment; Covalent binding.

Stereoselective Reduction of 3-Ketoproline Ethyl Ester Using Modified Borohydrides and Some Selected Vegetables.

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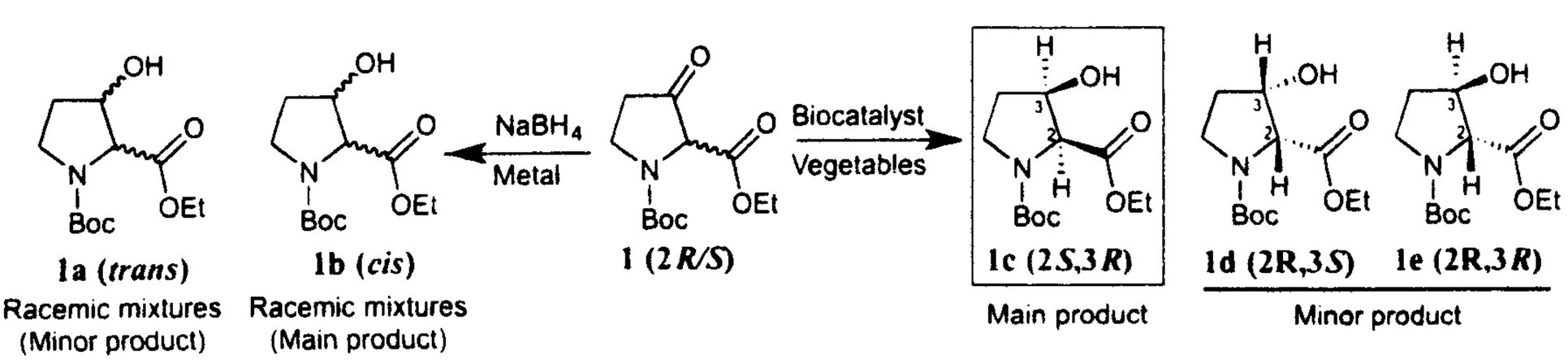
Reduction of racemic 3-ketoproline ethyl ester (**1**) by $NaBH_4$ in the presence of $CaCl_2$ and $MgCl_2$ as the chelating agents gave selective products *cis*-3(*R*/*S*)-hydroxyproline ethyl ester (**1b**), while reduction by $NaBH_4$ alone or chelated with $NiCl_2$ and $AlBr_3$ gave mixtures of *cis/trans* products. The reduction of racemate **1** by various vegetables and spices however, gave exclusively the *cis* products as the major and *trans* as the minor. On the contrary, reduction of racemate **1** by carrot afforded a mixture of *cis/trans* products, in which those *trans* product exists as the major product. In addition, we found this biocatalyst selectively converted all *S*-enantiomer of the racemate **1** to the *cis* product, and *R*-enantiomer to the mixture of *cis/trans* with *cis* product as the major. This fact suggested to use various fresh plant materials to employ the stereoselective reduction of diverse types of pyrrolidinones, as its stereoselectivity and selectivity to the racemic mixture is the highest compared to those using chemical reducing agents.



Keywords: Bioreduction; Vegetable and spice; Sodium borohydrate; Ketoproline.

Synthesis and Characterization of Coumaryl 1,3-Selenazole

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Coumaryl 1,3-selenazole was synthesized by reacting 3-(2-bromoacetyl)-chromen-2-one with selenourea using NaF as a catalyst in methanol/water (1:1) at room temperature. This reaction was completed in 30 minutes and purified by using column chromatography eluted with *n*-hexane/ethyl acetate (7:3) to give a good percentage yield. Two 3-acetyl-6,8-dihalo-chromen-2-one as precursors to 3-(2-bromoacetyl)-6,8-dihalo-chromen-2-one were also synthesized from corresponding benzaldehyde derivatives by reacting them with ethyl acetoacetate in the presence of piperidine. All the compounds were characterized by using IR, ^{1}H and ^{13}C NMR as well as mass spectral data.

Keywords : Coumarin, Selenazole, Synthesis, Characterization.

Synthesis and Antibacterial Activity of Novel Coumarinyl Azo-Chalcones

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Five new coumarinyl azo-chalcone derivatives have been synthesized through Claisen-Schmidt condensation from two synthesized coumarin and azo precursors. Knoevenagel condensation was applied to synthesis coumarin precursors with substituents ($N(CH_2CH_3)_2$, OH, Br and OCH_3) on the coumarin ring. Meanwhile, azo derivatives were prepared by coupling reaction between diazonium salt of different substituted aniline with salicylaldehyde. The structures of the newly synthesized compounds were confirmed by infrared and nuclear magnetic resonance (1D NMR) spectral data. The coumarinyl azo-chalcones were evaluated for their anti-bacterial activity against gram negative (*Escherichia coli, Pseudomonas eruginosa*) and gram positive (Staphylococcus aureus, Bacillus subtilis) bacteria. Among the compounds, only 3-((2*E*)-(3-(2'-hydroxy-5'-((4"-methylphenyl)diazenyl)-phenyl)acryloyl)-6-bromo-2*H*-chromen-2-one showed significant activity against both types of bacteria.

Keywords: Coumarin; Azo; Coumarinyl azo chalcone; Antibacterial.

Synthesis of flavokawain A derivatives and their effects on breast cancer MCF-7 and MDA-MB-231 cell lines

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The kava-kava plant (*Piper methysticum*) is traditionally consumed by the pacific islanders. Flavokawain B is a unique chalcone, which has been identified from the roots of the kava-kava plant. Our previous studies showed the flavokawain B is a potential molecules for breast cancer. So based on our previous studies, we have planned to prepare the several flavokawain A analogues and investigate their cytotoxic properties against breast cancer cell lines. We are also targeting the synthesis of flavokawain C by Claisen-Schmidt condensation reaction and evaluate for anti-cancer activities. All compounds have been screened against breast cancer MCF-7, MDA-MB-231 cell lines. Among the series of chalcones the compound flavokawain B and C were found to be potential candidates against breast cancer. The compounds were purified by column chromatography and crystallization with methanol. The structures of all compounds were determine by ^{1}H NMR, GC-FID, HMBC, HSQC and single X-ray analysis techniques. The finding of novel results will be present in the conference.

Keywords: Flavokawain A; Chalcone synthesis; Cytotoxic activity; X-Ray analysis.

Isolation and Synthesis of Pinocembrin and Pinostrobin from *Artocarpus odoratissimus*

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Artocarpus odoratissimus is native to Borneo and Mindanao Island. In Sarawak, it is locally known as *Terap*. Previous studies showed *Artocarpus* species are rich in phenolic compounds, including flavonoids, stilbenoids and arylbenzofurons. The chemical profile of the indigenous plants from Sarawak, such as *A. odoratissimus* has not been studied intensively and the analyses of medicinal properties have not been explored. Thus, a phytochemical study is carried out on the root extracts of *A. odoratissimus* using various chromatographic methods and it has led to the isolation of two known flavonoids, namely pinocembrin (1) and pinostrobin (2). The structures are identified by comparison of their ^{1}H and ^{13}C NMR data with those reported in the literature. Flavonoid molecule incorporated as multifunctional in the pharmaceutical industry. It has a vast range of pharmacological activities, such as antimicrobial, anti-inflammatory, antioxidant, and anticancer activities. Pinocembrin and pinostrobin which are successfully synthesized with 2-hydroxy,4,5-methoxyacetphenone and benzaldehyde as starting materials will be presented.

Keywords: Artocarpus odoratissimus; Synthesis; Pinocembrin; Pinostrobin.

Novel Coumarin Based Ligands in the Suzuki-Miyaura and Mizoroki-Heck Cross-Couplings under Aqueous Medium

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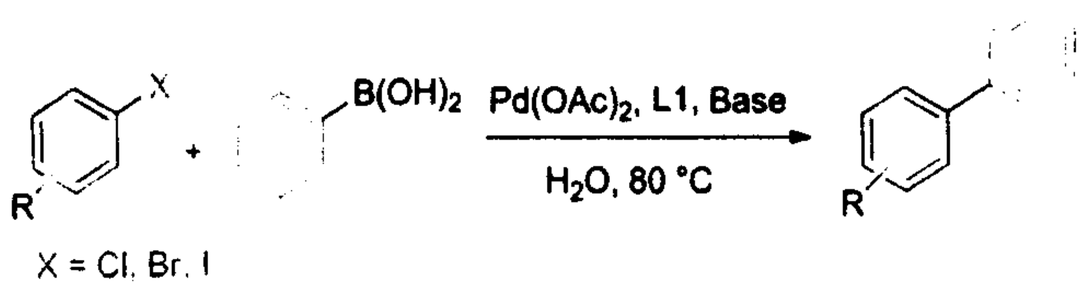
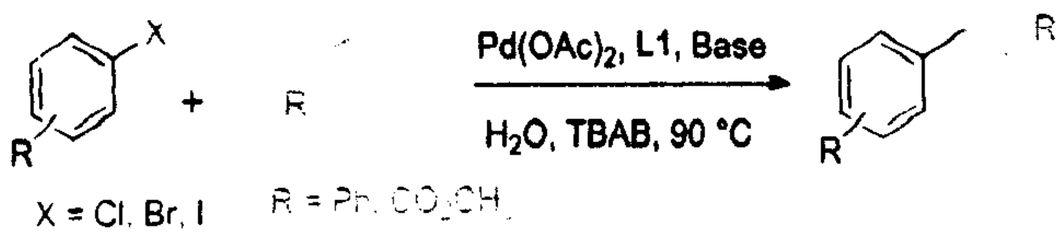
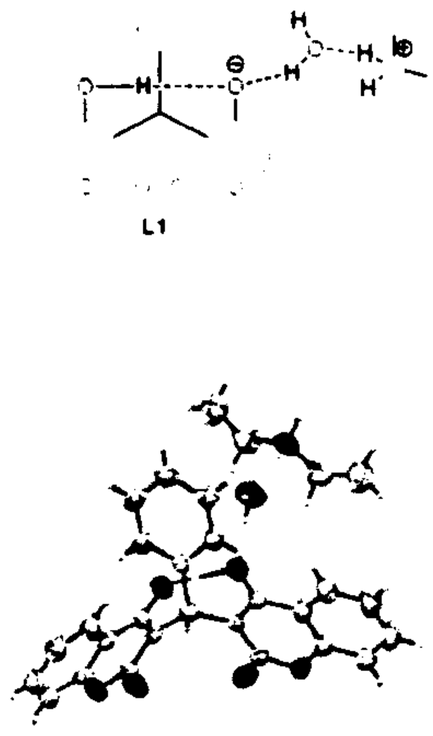
Novel coumarin based ligands (benzylidine-bis-(4-hydroxycoumarin)-diethylamines) are easily synthesized from 4-hydroxycoumarin, aromatic aldehydes and diethyl amine.[1] The ionic structure of the ligands was established by x-ray study. These ligands are air stable and gave a stable complex with $Pd(OAc)_2$ on ligation. The Pd-ligand complex is explored as highly efficient catalysts at 0.1 mol% loading in the Suzuki-Miyaura[1] and Mizoroki-Heck[2] cross-coupling reactions in water and/or water/ethanol mixture. The catalytic system was reused in the reactions and also found that a variety of functional groups can be tolerated during the reaction.







L1

Keywords: Cross-coupling reactions; C-C bond formation; Palladium acetate; Homogeneous catalysis.

Synthesis and Antibacterial Studies of Bis(thiourea) Derivatives with Variable Chain Length

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A series of 1,4-bis(decoxyphenyl)carbamothioyl]terephthalamide derivatives was successfully synthesised by reaction of benzene-1,4-dicarbonyl isothiocyanate intermediates with long alkyl chain. The alkylation was performed through reaction of 4-acetamidophenol into suspension of bromoalkane in a presence of K_2CO_3 *via* Wiliamson ether synthesis method. The synthesised bis(thiourea) derivatives differed in the length of the alkyl groups, C_nH_{2n+1}, where n=10, 12 and 14. The structures of all compounds were characterised by elemental CHN analysis, IR, ^{1}H- and ^{13}C-NMR spectroscopy. Antibacterial activity of the compounds were carried out against gram-negative bacteria (*Escherichia coli*, ATCC 25922) to evaluate the effect of alkyl groups of the synthesised bis(thiourea). The synthesised compounds have shown significant antibacterial activities.

Keyword: Bis(thiourea); Antibacterial activity; Alkyl group; Spectroscopy.

A New Microwave-Assisted Approach for the Preparation of 4-Aminopyrazolo[1,5-*a*][1,3,5]triazines

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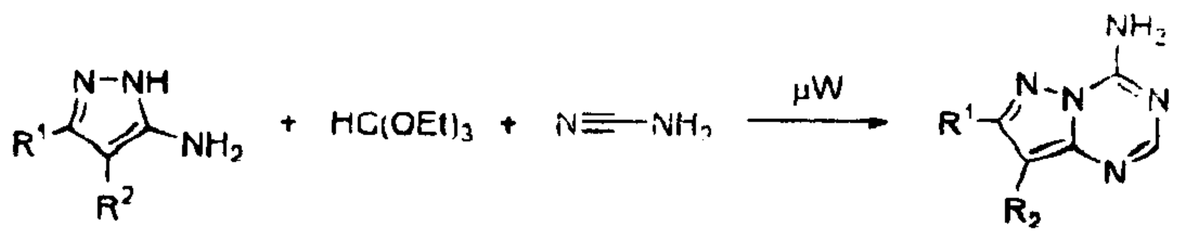
Purine isosteres have been the constant focus of drug discovery programs. 5-Aza-9-deaza-isostere of adenine (4-aminopyrazolo[1,5-*a*][1,3,5]triazine) is one of the actively investigated scaffolds in medicinal chemistry resulting in ongoing demands for the development of new effective methods for the synthesis of these compounds. Drawbacks of the existing stepwise methods prompt our attempt to develop a novel multicomponent strategy for the efficient synthesis of 4-aminopyrazolo[1,5-*a*][1,3,5]triazines. In the optimization stage, a multicomponent reaction of 5-amino-3-phenylpyrazole, triethyl orthoformate and cyanamide under conventional heating resulted in the formation of complex mixtures with low content of the desired product. A dramatic change in the outcome of the reaction was observed when it was carried out under microwave irradiation leading to good yields and purity of 4-amino-7-phenylpyrazolo[1,5-*a*][1,3,5]triazine. We further explored scope of our new multicomponent microwave-assisted method and found it to be successful for the preparation of diversely substituted library of 5-aza-9-deaza-adenines incorporating amino, cyano and ester groups. The reaction proceeded chemo- and regioselectively affording 4-aminopyrazolo[1,5-*a*][1,3,5]triazines under catalyst-free conditions with only slight variations in the optimal conditions for different starting aminopyrazoles. Our successful synthesis proved the versatility and broad scope of this new microwave-assisted method. Operational simplicity, short reaction time and high product purity makes this an attractive approach for generation of compound libraries in the drug discovery process.



R^1 = H, Ar, NR^3R^4 ; R^2 = H, Ar, CN, CO_2Et

Keywords: Pyrazoles; Multicomponent reaction; Microwave-assisted synthesis; Purine isosteres.

Synthetic Strategies to Design Porphyrin Architectures

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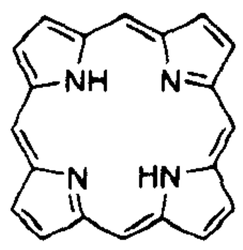
The beauty of naturally occuring porphyrins were reflected *via* their availability as the core structure for heme in hemoglobin and chlorophyll in photosynthesis process. In this respect, mimicking the natural existence always drive many interests which have contributed to the extensive exploration of diverse synthetic pathways. The similar approach was also investigated in regard to the porphyrin molecular system. The synthesis of basic porphyrin structure can be realized *via* Adler-Longo or Lindsey condensation reactions. The versatility of Senge S_N reaction enabled the further introduction of different functionalities at porphyrin periphery. Additionally, the novel inter-porphyrins assembly in monomer, dimer and trimer arrays were accomplished *via* metal catalysed reactions such as Suzuki, Heck and Sonogashira cross coupling. Interestingly, a new synthetic route to prepare the functionalized porphyrins was successfully developed based on tebbe and petatesis reactions. Overall, the architecture of a synthetic porphyrin as compared to the natural occurrence can be designed and achievable *via* the respective methodologies. The established strategies also useful towards modulating the biological or photophysical properties of porphyrins for the advanced material applications.



Porphyrin

Keywords: Porphyrin; Condensation; S_N; Metal-catalysed.

Synthesis and Biological Study of Azo Derivatives and Aspirin-azo Derivatives

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The chemistry of aspirin and azo derivatives have been widely studied and developed as drugs for pharmaceutical purposes. Azo derivatives have been claimed to exhibit various biological activities such as anticancer and antibacterial activities. In this study, synthesis of azo derivatives was carried out *via* diazotiation followed by coupling reaction. Aspirin was incorporated with azo moiety in the presence of DCC and DMAP. The structures of the synthesized compounds were characterized using elemental analysis (CHN), nuclear magnetic resonance (^{1}H NMR and ^{13}C NMR) and Fourier Transform Infrared (FTIR) spectroscopy. The synthesized aspirin-azo derivatives were screened for their anticancer activity against HK-1 nasopharyngeal cancer cell lines and the viability of cultured cells was determined by MTS [3-(4,5-dimethyl-2-yl)-5,3-carboxylmethoxylphenyl)-2-(sulfophenl)-2H-tetrazolium4]-based colorimetric assay and also tested on antibacterial activity against *Escherichia coli* ATCC 25922 and *Staphylococcus aureus* S48/81 *via* turbidimetric kinetic method. The anticancer activity and antibacterial activity shown by synthesised compounds were due to substitution of flouro, chloro, bromo, iodo and phenyl rings. However, the newly synthesised aspirin-azo derivatives showed poor anticancer and antibacterial activity against tested bacteria. The effect of the molecular structure of the synthesised compounds on the anticancer activity and antibacterial activity is discussed.

Keywords: Aspirin; Azo derivatives; Antibacterial activity; Anticancer activity.

Evaluation of Antibacterial Activity of Organotin(IV) Complexes with Methyl-2-pyridylketone-2-hydrazinopyridine Ligand

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Nowadays, the studies on synthesis of organotin(IV) complexes with hydrazone ligand become more interesting because of their potential in a lot of applications including biological activities. Therefore, until today the discovery of the biological potential of the complexes with hydrazone ligand still have been attracted many of researchers. In our recent studies, four new organotin(IV) complexes of the type $MeSnCl_2(C_{12}H_{12}N_4)$ (**2**), $BuSnCl_2(C_{12}H_{12}N_4)$ (**3**) and $PhSnCl_2(C_{12}H_{12}N_4)$ (**4**) and $Ph_2SnCl(C_{12}H_{12}N_4)$ (**5**) were synthesized by the direct reaction of methyl-2-pyridylketone-2-hydrazinopyridine ligand (**1**) and organotin(IV) chloride(s) in absolute methanol. The ligand (**1**) and its organotin(IV) complexes (**2-5**) also have been characterized by molar conductivity, UV-Visible, FT-IR, ^1H and ^{13}C NMR spectral studies. Finally, all of the synthesized compounds were screened for antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. Upon coordination the antibacterial activity of both tin and hydrazones significantly increases. Furthermore, it has been shown that butyltin (IV) and diphenyltin (IV) derivatives exhibit significantly better activity towards *E. coli* and *S. aureus* respectively compared to the other complexes.

Keywords : Hydrazone ligand; Complexes; Spectral studies; Antibacterial.

Abstract of Poster Presenters

"from fundamental research to industrial applications"

Chemical Constituents from *Enterobacter cloacae*

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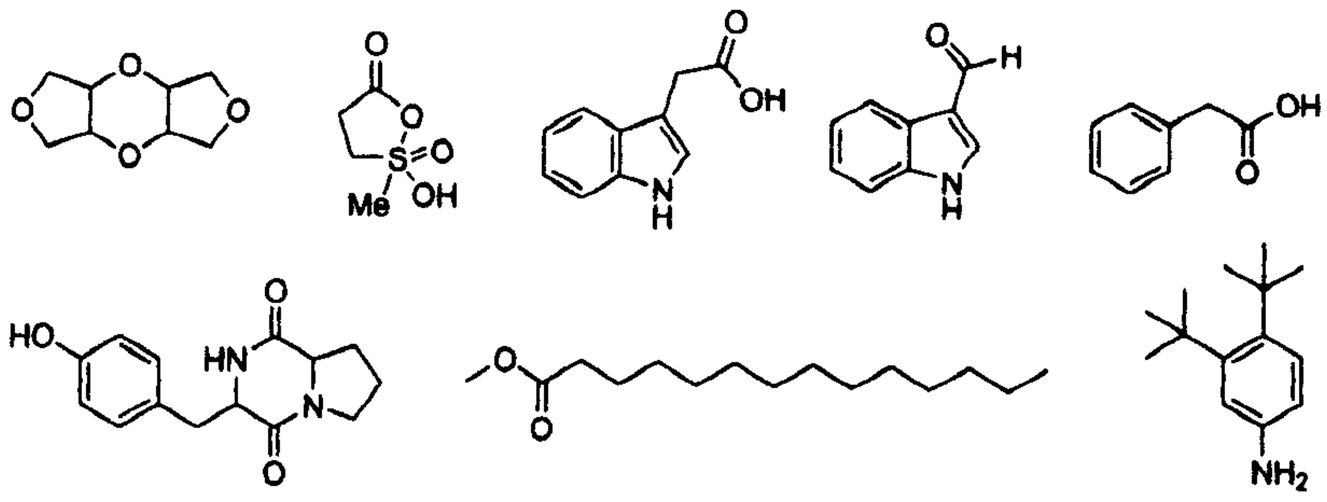
The *Enterobacter cloacae* is classified as Gram-negative proteobacterium, a pathogen, and is resistant to β-lactam antibiotics causing a wide range of infections such as bacteremia, tissue, respiratory, urinary, heart, and intra-abdominal infections. *E. cloacae* is also found in the soil ecology and in plants. In explosive contaminated soil, *E. cloacae* is capable of aerobically metabolizing the explosive pentaerythritoltetranitrate (PETN). The *E. cloacae* is also shown to be an endophyte in plants which produce plant hormone auxin such as indole acetic acid (IAA). Recent studies have indicated that *E. cloacae* utilize quorum sensing to coordinate gene expression in a density-based environment by producing the *N*-acyl homoserine lactones. In the present study, the *E. cloacae* was obtained from the Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia and was subjected to the chemical constituents investigation. The fermentation culture of this bacterial species has successfully yielded two new compounds and six known compounds. These compounds were isolated and characterized using extensive chromatographic and spectroscopic methods, and were subjected to cytotoxicity evaluations.



Keywords: *Enterobacter cloacae*; Oxolane; Oxathiolane; Spectroscopic analysis.

P02

Pictet-Spengler Condensation: A Review of Total Synthesis of Canthin-6-one

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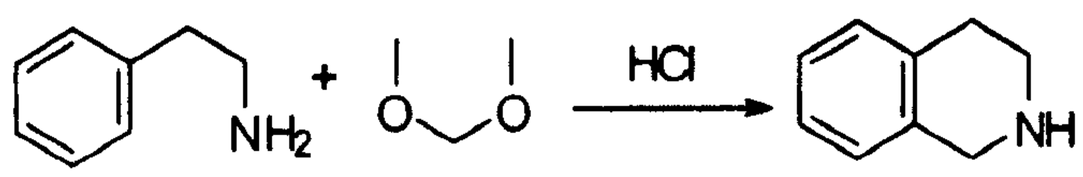
Pictet-Spengler condensation reaction is considered the most powerful method to date for the synthesis of alkaloids. The reaction was conceived and created by Swedish chemists Amè Pictet and Theodor Spengler in 1911. The reactioninvolved β-phenylethylamine (**1**) and formaldehyde dimethyl acetal (**2**) in the presence of hydrochloric acid forming an alkaloid, 1,2,3,4-tetrahydroisoquinoline (THIQ) (**3**)(Scheme 1). This paper reviews the progress of PS reaction in total synthesis of canthin-6-one.



1 **2** **3**

Scheme 1

Keywords: Pictet-Spengler; Canthin-6-one; Simaroubaceae; β-Carboline alkoloids.

Synthesis And Characterization Of Liquid Crystalline Compounds From Dibenzo Tetraaza[14]annulene And Its Nickel Complex

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A new Substituted Dibenzo Tetraaza[14]annulene (DBTA) compound and its Nickel complex were prepared and characterized using ^{1}H, ^{13}C NMR and UV-vis spectra. The compound possesses a planar structure and four nitrogen atoms were coordinated to Nickel ion in square planar geometry which is shown as weak d-d transition at 505nm in UV-vis spectra. The existing six alkyl chains surrounding the DBTA and its complex structure rearrange themselves as discotic columnar in liquid crystal phase which can be observed under Optical Polarized Microscope (OPM) at temperature range 175°C to 197°C.

Keywords: Complexes; Square planar; d-d Transition; Discotic columnar.

P04

Synthesis, Characterization and Biological Activities of Acridine Derivatives

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Acridine is derivative from α-mangostin, known for pharmacological properties. The new platinum complexes were synthesized successfully and characterized by elemental analysis CHNS, UV-Vis, FTIR, ^{1}H NMR, ^{13}C NMR, APT NMR, thermogravimetric analysis TGA and single X-ray crystallography. The substituents in the acridine ring system contribute to the biological activity anticancer property against MCF-7 human breast cancer cell line (examined through MTT Cytotoxicity Assay)

Keywords: Platinum complex; Acridine; MTT cytotoxicity assay; Anticancer.

P05

Synthetic Studies Towards Biologically Active of γ-lactam Sulfonamides Type Compounds via 1,4-conjugate Addition Reactions

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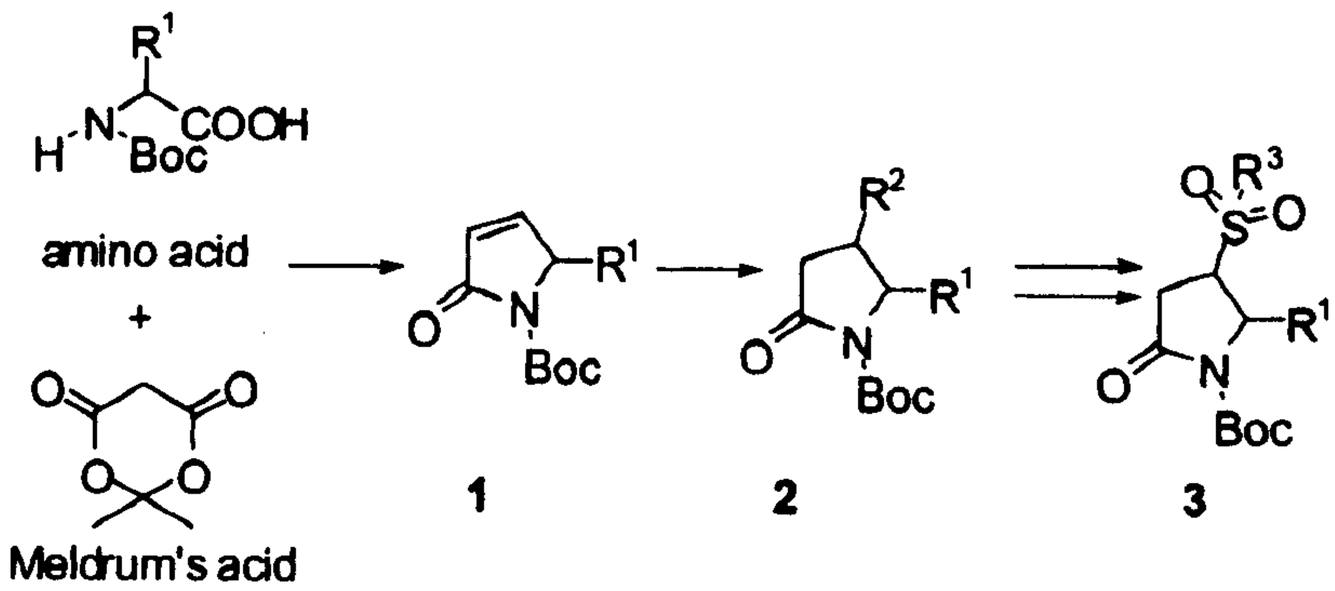
Tetramic acid or 2,3-pyrrolidinones are common functionality found in nature especially in some biologically active natural alkaloid type compounds. In different class of chemical functionality, sulfonamide is also considered as an important pharmacophore, which is present in a number of biologically active molecules, particularly antimicrobial agents. Therefore, in our synthetic endeavor for the title compounds **(3)** an essential intermediates of **(1)** was successfully constructed in 3 steps, started with cyclization of the *N*-protected amino acids with Meldrum's acid and followed by reduction of diketo and lastly elimination of the alcohol functionality. Upon having **(1)** in hand some chemical exploration towards 1,4-nucleophilic Michael's conjugate type reaction was successfully conducted by employing different nucleophiles of malonates and amines to give compound **(2)** in moderate yield. Subsequently, some chemical explorations namely decarboxylation, reduction and coupling with sulfonyl moiety with compound **(2)** are now in progress in our laboratory.



Keywords: 3-Pyrrolin-2-ones; Michael addition; malonates; Amines.

P06

Synthesis, Characterization And Determination Of Mesophase Transition Of Compounds With Different Terminal Chain Length

Zuhair Jamain, Melati Khairuddean*, Nurul Nabilah Zulbaharen, Tham Keen Chung

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Reaction of *p*-nitroaniline with phenol formed intermediate **1**, 4-(4-nitrophenylazo)-phenol. Alkylation of **1** with pentyl, nonyl and dodecylbromide intermediates **2a-c**, (4-nitrophenyl)-4(4-alkoxyphenyl)-diazene. These nitro intermediates **2a-c** were reduced to afford intermediates **3a-c**, 4-(4-alkoxy-phenylazo)-phenylamine. Alkylation reaction of *p*-hydroxybenzaldehyde with heptyl and dodecylbromide gave intermediates **4a-b**, 4-alkoxybenzaldehyde. Cross condensation reactions of **3a-c** and **4a-b** gave four compounds, **5a-f**, with an azo and Schiff base linking units but with different chain length at both terminal positions. All the compounds were characterized using Fourier Transform Infrared spectroscopy (FT-IR), ^{1}H and ^{13}C Nuclear Magnetic Resonance spectroscopy (NMR) and CHN elemental analysis. The mesophase transitions of these compounds were determined using Polarized Optical Microscope (POM) and Differential Scanning Calorimetry (DSC). It was observed that compounds **5b**, **5c**, **5d**, **5e** and **5f** were mesogenic while compound **5a** was not mesogenic. Other intermediates, **1, 2a-c, 3a-c** and **4a-b** were also found to be non-mesogenic.

Keywords: Azo; Schiff base; Alkylation; Mesophase.

Proline-Catalyzed Facile Synthesis of Vanillyl Derivatives

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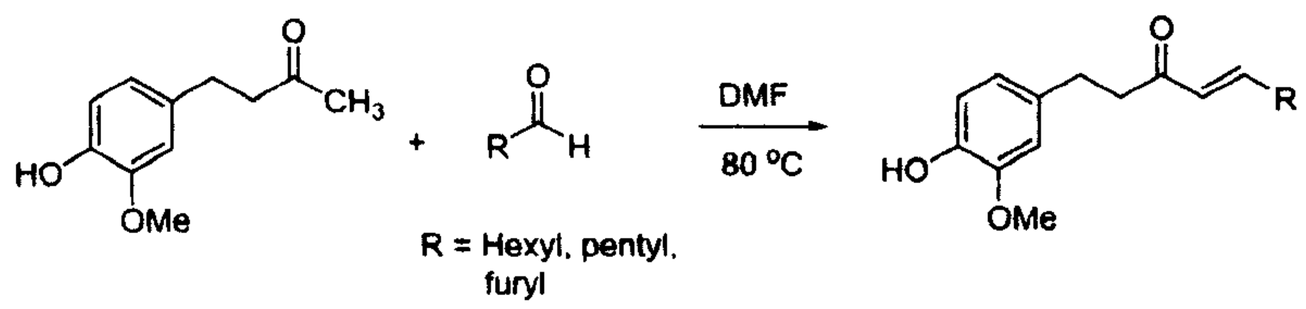
Ginger is widely used as a dietary condiment throughout the world, and also used as an important medicine in China and Japan. Its major pungent ingredient, (+)-(S)-[6]-gingerol has been found to exhibit diverse pharmacological activities such as antioxidant,[1] anti-inflammatory[2], anti-tumor-promoting[3], BuChE inhibitory[4] anti-platelet aggregation[5] and anti-bacterial effects.[6] In spite of the fact of their broad and interesting bioactivities and structural simplicity, surprisingly only a handful of examples for their synthesis can be identified.[7]

We have developed a simple method to synthesize vanillyl derivatives by employing a new catalyst L-proline. Vanillyl derivatives were synthesized by treating vanillyl acetone with an aldehyde to produce the corresponding product in DMF at 80 °C as shown in the Scheme 1.

Scheme 1:



Keywords: Vanillyl acetone; Aldehyde; L-Proline; DMF.

Synthesis of Key Intermediate of Codonopsinine Employing α-Bromination of 2,3-Diketopyrrolidine

Muhammad Faezuan Izuddin[1], Mohd Fazli Mohammat[2]*, Zurina Shaameri[2], Ahmad Sazali Hamzah[2]

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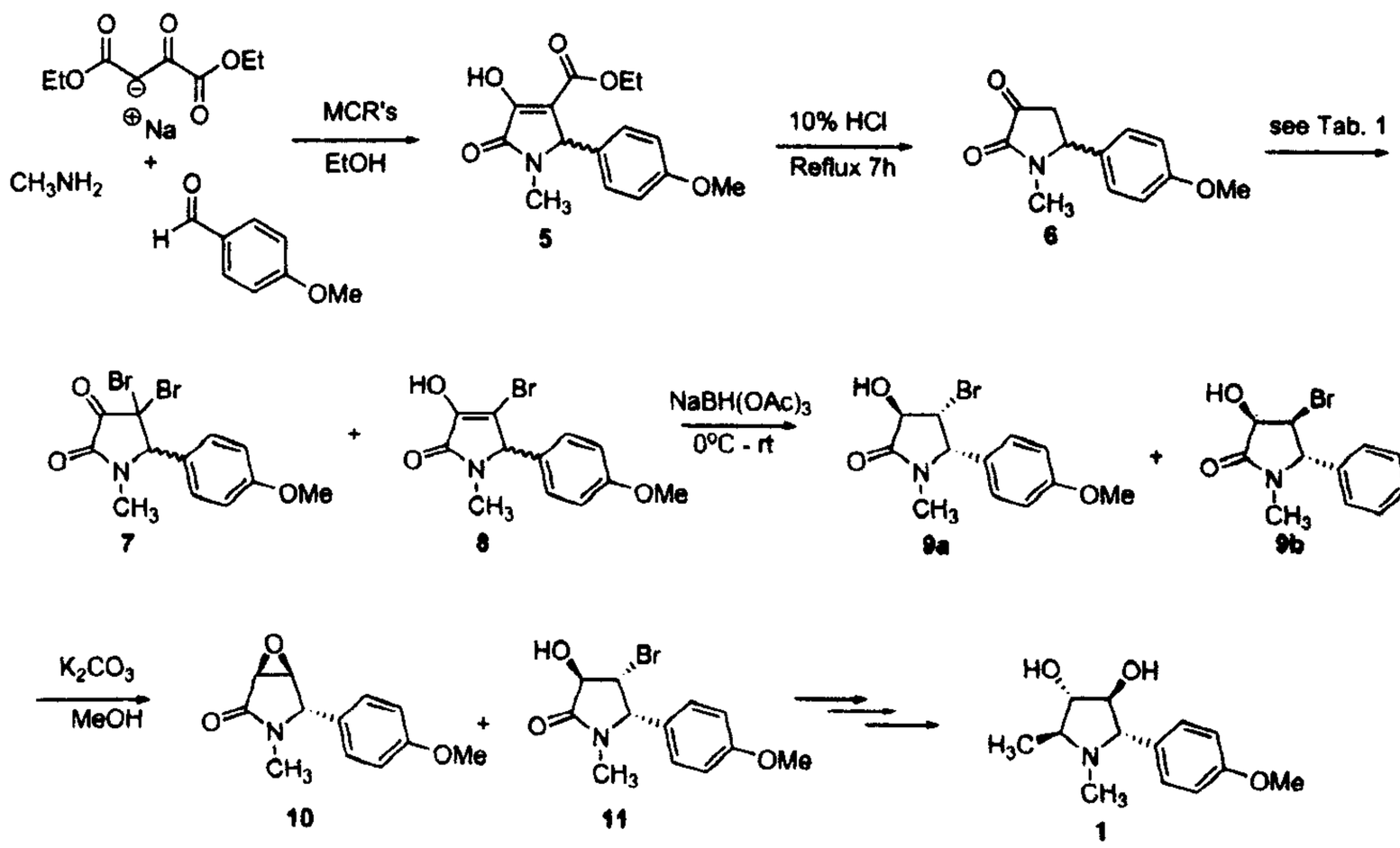
α-Bromination of 2,3-diketopyrrolidine, **6** was selectivity obtained by using two kind of brominating agent. This synthetic procedure was applied to the preparation of the key intermediate of the bioactive natural compound, (-)-codonopsinine.



Keywords: Synthesis; Multicomponent reactions (MCRs); Pyrrolidone; Chemical transformation.

P10

Theoretical Studies and Rational Design of Symmetrical and Unsymmetrical Squarine Dyes: An Application for Dye Sensitized Solar Cells (DSSC's)

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Rational structural designed will involve a number of electron-donating (ED) on starred position and electron-withdrawing (EW) units on unstrarred position of π-conjugated bridge of the designed dye, based on Dewar's rules. This will effect the highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) energy level thus, reducing the band gap. A well performing dye, symmetrical indolenine-based squaraine dye (symm-SQM) and unsymmetrical indolenine-based squaraine dye (unsymm-SQM) will be calculated and modified theoretically. Density functional theory (DFT) and time-dependent density functional theory (TD-DFT) is carried out in order to compute, predict and optimize the performance of organic dyes studied. The effects of these alternations on the molecular structures and the electron absorption spectra are calculated using TD-DFT and compared with UV-Vis absorption spectra of the dye synthesised. Designing organic dye solar sensitizer is time consuming. Advanced theoretical methods to modify structure and light absorption property of organic dye is done in order to maximize dye efficiency and minimize synthesis process.

Keywords: Density functional theory (DFT); Time-dependent density functional theory (TD-DFT); Highest occupied molecular orbital (HOMO); Lowest unoccupied molecular orbital (LUMO).

Tetraaza [14] Annulene-based DSSC dyes: Design, Synthesis and DFT Computational Studies

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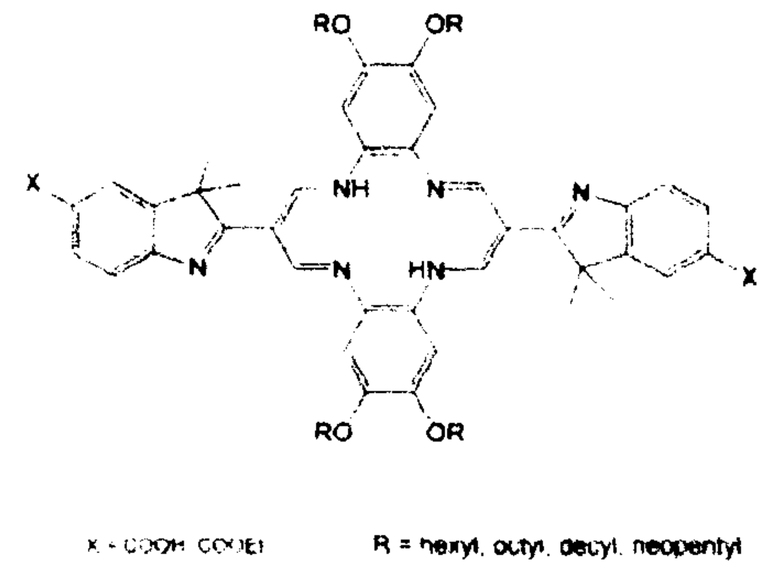
A novel series of macrocyclic compounds, based on the structure of Tetraaza [14] Annulene, were designed and prepared for their potential application as dyes in Dye Sensitized Solar Cells (DSSCs). The molecules are furnished with anchoring groups, -COOH or –COOEt, for a more efficient electron transfer from the dye to TiO2 film. To prevent the aggregation of the dyes, the structures are decorated with various alkoxy groups. In addition to photophysical and electrochemical studies, Density Functional Theory (DFT) computation provided an insight about the details of the electron transfer process and the potential of the compounds as dyes.



Keywords: Tetraaza [14] Annulene; Dual anchoring group; DFT; Dye-sensitized solar cell.

Exploiting Amide Macrocycle in the Formation of [2]-Pseudorotaxane

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Pyridine-2,6-dicarboxamide group has been frequently utilised in the development of amide-based acyclic and macrocyclic receptors. These receptors commonly exploit the hydrogen bonding ability of the pyridine nitrogen lone pair of electrons for either the preorganization of hydrogen bonding 2,6-amide functional groups on the receptor or for complementary hydrogen bond acceptance from a neutral guests such as pyridone, urea and amide. We synthesized the pyridine macrocycle (PM) *via* three steps under basic conditions in high dilution to afford the macrocyclic host (22%). The crystals of PM were grown from vapor diffusion of cyclohexane and tetrahydrofuran. Interestingly, the macrocycle crystallise with a molecule of tetrahydrofuran located within its cavity, whereas the tetrahydrofuran oxygen acting as hydrogen bond acceptor. The N•••O distances are 3.06 and 3.10 Å. Initial binding studies with model amide guest revealed downfiled shift of the amide proton with K_a = 1440 ± 150 M^{-1} in $CDCl_3$ at 25˚C. Analysis of the ^1H NMR spectra of macrocycle MP in $CDCl_3$ upon the addition of model urea compound indicated significant downfield shift of the urea proton resonances. Accordingly, the strength of the complexation was evaluated using single-point method, giving a K_a value of 1920 ± 200 M^{-1}. On that account, both binding experiments gives a comparable high association constants which demonstrated that urea and amide are suitable guests for macrocycle MP in the formation of [2]-pseudorotaxane.

Keywords: Macrocycle; [2]-Pseudorotaxane; Hydrogen bonding; Binding constant.

P13

Design and Discovery of Novel 11β-hydroxysteroid dehydrogenase type-1 inhibitor

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Deregulation of energy metabolism is one of the predisposing factors for obesity. Glucocorticoids are the key regulators of energy metabolism and their levels in the body are governed by 11β-hydroxysteroid dehydrogenase 1 (11 β-HSD1). It converts inactive cortisone to active cortisol and increases its levels in liver and adipose tissues leading to obesity. Therefore, discovery of novel compounds inhibiting the activity of 11β-HSD1 is a promising approach to discover antiobesity drugs. The molecular docking tool, GLIDE (Schrodinger Inc., USA; release 2014-2) was used for docking studies into 11β-hydroxysteroid dehydrogenase type 1 (11β-HSD1) receptor binding pocket and the crystal structure of 11β-HSD1 was obtained from the RCSB protein data bank (PDB ID: 4K1L). Based on the docking results, we synthesized a set of novel tetrahydrothiazolopyridine derivatives that specifically target 11β- HSD1 and studied their ability to interfere with the cortisol metabolism in the 3T3-L1 adipocytes. Among the set of synthesised compounds, the compound ERGS-TR13A showed the highest potency against 11β-HSD1 by dose-dependently inhibiting conversion of cortisone to cortisol, adipocyte differentiation, showed promosing candidate, and offer a novel therapeutic strategy to ameliorate metabolic alterations found in obesity and diabetes.

Keywords: 11β-HSD1; Adipocyte; Obesity; Drug design.

Exploration of Alkylidenemalononitrile Enamines Towards the Synthesis of 4-N,N-dialkylamino-2-chloro/amino Nicotinonitriles

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Alkylidenemalononitrile systems serve as useful precursors to produce polysubstituted azaheterocycles. Enamines derived from alkylidenemalononitriles have been known for some time for Pinner and amine-initiated cyclizations towards the synthesis of substituted pyridines. Recently, Longstreet, A. R. *et al.*, explored the reactivity of these enamines to access a wide range of 4,5-disubstituted 2-halonicotinonitrile scaffolds and 2-Chloro-3-amino-4-picoline; a strategic building block for the preparation of nevirapine. Despite the advances described above, synthetic routes to access 4-alkylamine substituted-2-halonicotinonitriles are largely unexplored.

In continuation of our research on utility of 2-(1-ethoxyethylidene)malononitrile (**1**) towards the synthesis of alkoxy thiophenes and pyridines, we investigated the enamines derived from **1** to introduce different alkylamine stubituents at 4th position of the pyridine ring system. The method involves reaction of secondary amines (cyclic or acyclic) with **1** resulting a new series of alkylidenemalononitriles, which upon conversion to the respective enamines followed by acid or amine mediated cyclization to yield 4-alkylamine substituted nicotinonitriles. The method allowed to introduce different cyclic and acyclic alkylamines at 4th position of pyridine ring system. In addition to the versatility, milder reaction conditions and the feasibility to develop a one pot reaction is the advantage of this method. Further research to introduce heterocyclic amines and alkoxy substituents has been undertaken. Herein we will report the new synthetic methodology, ^{1}HNMR characterisation and preliminary biological activity results of the synthesised compounds.

Keywords: Alkylidenemalononitriles; Nicotinonitriles; 4-Alkylamino pyridines; 2-Chloronicotinonitriles.

Effect of Time, Inoculum (%) and Mass Substrate on Succinic Acid by Immobilized Escherichia Coli In Fermentation Process

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The study on succinic acid production from glycerol residue has shown potential as low cost substrate using immobilized *Escherichia coli* in fermentation process. In this research, the cell were prepared by entrapment method. This method was chosen since it was reported to be effective in producing large production of succinic acid. The effect of different time, inoculums, and mass substrate values on succinic acid production was studied. Batch culture technique was employed to grow the *Escherichia coli* and entrapment method for immobilized cell was employed. The succinic acid concentration was determined by the high performance liquid chromatography (HPLC). The optimum time was observed at 30 gram mass substrate (117.9896232 g/L succinic acid production) and inoculums at 20% working volume (102.30 g/L succinic acid concentration was produced) and at 4 hour (110.2 g/L succinic acid concentration) give the highest succinic acid concentration. Preliminary characterization of raw material was done by using High performance chromatography and fourier transform infrared spectrometry (FTIR). The result was then compared to raw material (glycerol residue), glycerol treated (after pre-treatment) and succinic acid concentration.

Keywords: Succinic acid; Glycerol; Glycerol residue; Immobilized cell.

P16

I_2-TBHP Catalyzed Oxidative Cross-Coupling of *N*-sulfonylhydrazones and Isocyanides to 5-Aminopyrazoles

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Hydrazones are important precursors in synthetic chemistry owing to their high reactivity. In particular, the formation of 1,2-diaza-1,3-dienes (azo-alkenes) from dehydrohalogenation of hydrazones has emerged as a powerful tool for the synthesis of nitrogen containing heterocycles. However, oxidative C-H functionalization approach to obtain these azo-alkenes has been less exploited. On the other hand, 5-Aminopyrazoles are one of the privileged classes of nitrogen heterocycles and they find extensive application in pharmaceutical chemistry and possess versatile biological properties In this context, we herein presented the I_2-TBHP catalyzed oxidative cross coupling of *N*-sulfonylhydrazones with isocyanides for the synthesis of 5-aminopyrazoles through formal [4+1] annulation via in situ azo-alkenes formation. The notable features are metal/alkyne free strategy, C-C and C-N bond formation, atom economy, catalytic I_2, broad functional group tolerance, good reaction yields, shorter time and also applicable to one-pot methodology.

Keywords: Oxidative, Azoalkenes, Isocyanides, Pyrazoles.

Iron (II) Complex of Anthraquinone: Synthesis, Structural Elucidation and Antimicrobial Activity

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Our continuing interest in anthraquinones had led us to look at the synthesis of metal complex by reacting our major compound, nordamnacanthal with transation metal, Iron (II). Fe (II)-nordamnacanthal complex $[Fe_2L(H_2O)_4]$ had been synthesized succesfully via telescoping synthesis/ one-pot reaction.The ligand and its metal complex were established by 1D and 2D NMR Spectroscopy, UV-VIS, MS,CHNS and IR analysis. They were evaluated for their antimicrobial activity using Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC). Fe(II)-nordamnacanthal complex showed stronger inhibition against *Pseudomonas aeruginosa at concentration* 450 μg/mL *and Proteus vulgaris and Klebsiella pneumoniae* anc *Salmonella* at concentration 225 μg/mL compare to nordamnacanthal. In this work, the synthesizec compound, Fe (II)-nordamnacanthal complex $[Fe_2L(H_2O)_4]$ showed more significant antimicrobia activity compared to the ligand itself.

Keywords: Nordamnacanthal; Transition metal Iron (II); Fe (II)-nordamnacanthal complex $[Fe_2L(H_2O)_4]$; Antimicrobial activity.

P18

Protection and Deprotection of 1,2- and 1,3-Diols as Acetonides using PVP/Iodine, a Mild, Efficient and Reusable Catalyst

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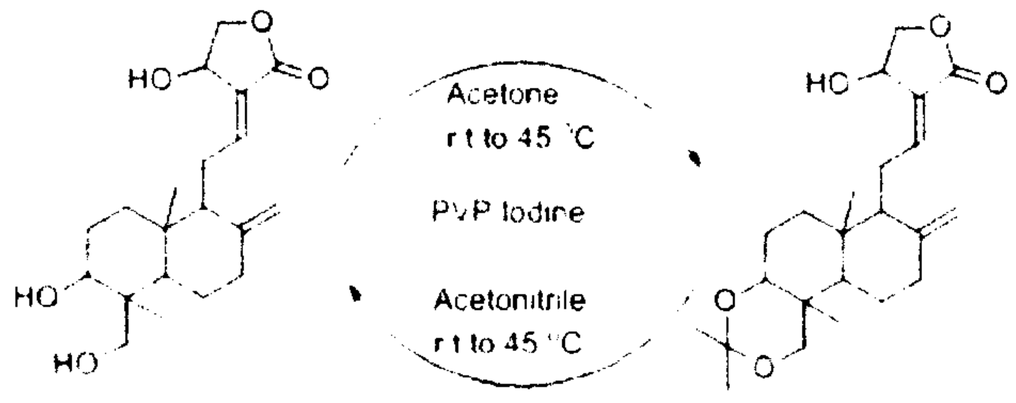
In an efficient, economical and environmental-friendly process, 1,2- and 1,3-diols were easily protected as acetonides in excellent yields using PVP/Iodine as a heterogeneous catalyst in acetone. Deprotection of the resulting acetonides could easily be achieved using the same catalyst but in acetonitrile. Further, the catalyst can be recovered and reused for three times without significant loss of its activity. The method is broadly applicable to various substrates and particularly useful for the deprotection of acetonides in presence of acid-sensitive groups.



Keywords: Acetonide; Diol; PVP/Iodine; Heterogeneous catalyst.

P19

Isolation of β-Mangostin and Semi-synthesis of Its Derivatives

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β-mangostin is the major secondary metabolite present in the species *Garcinia mangostana*. We recently carried out semisynthetic reactions to prepare bioactive derivatives from the starting material β-mangostin. β-mangostin has been reported to possess potent medicinal and pharmacological activities especially anti-inflammatory and anti-cancer activities. β-mangostin was isolated abundantly from the chloroform and ethyl acetate extract of the stem bark of *Garcinia mangostana* and purified using column chromatographic method to afford a 1.2g yield. This study is focused on the isolation and structural modification of β-mangostin using selective O-alkylation method. Six β-mangostin derivatives were successfully synthesized which are fuscaxanthone C, β-mangostin monoacetate, butyl-β-mangostin, propyl-2-methyl-β-mangostin, hexyl-β-mangostin and methylbenzyl- β-mangostin. The structures of these compounds were elucidated and confirmed with the aid of spectroscopic techniques such as IR, GC-MS and 1D-NMR. We report here the isolation of β-mangostin and its structural modification to give six β-mangostin derivatives.

Keywords: Semi-synthesis; Beta-mangostin; Garcinia mangostana; Derivatives.

P20

Synthesis of Novel N-vanillylcycloalk-1-ene-1-carboxamide Derivatives

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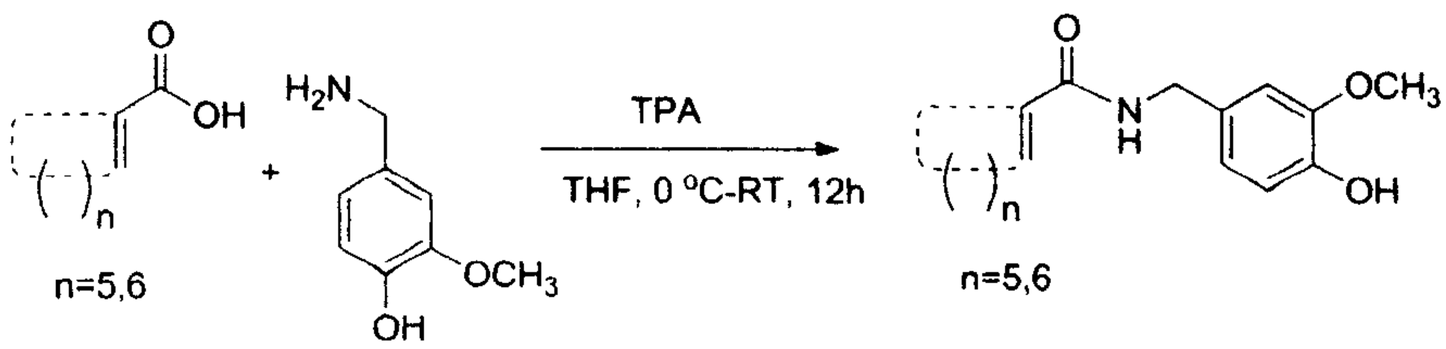
Vanillyl group means 3-methoxy-4-hydroxy-benzyl group. The compounds containg vanillyl group are known as vanilloids. These compounds are abundantly present in plants belongs to Zingiberaceae family and possess wide array biological properties. The most prominent examples capsaicin, curcumin, gingerol etc. In addition to vanillyl moiety, vanilloids also conatins another important pharmacophore α,β-unsaturated carbonyl group in addition to higher alkyl groups in the side chain. However, open chain α,β-unsaturated carbonyl group is known as promiscuous group because it's binding to the receptors is not selective and may result in false-positive activities. Also the free higher alkyl chain makes the compound very flexible which results in existence of many number of conformers in biological environment which may be accounted for decreased and non-selecitve activity. Therefore, in an attempt to synthesise a compound that retains all the essential pharmacophoric features of vanilloids while improving its selectivity towards receptors and activity, we have synthesised novel N-vanillylcycloalk-1-ene-1-carboxamide derivatives. In these compounds the α,β-double bond with respect to keto group was made endocyclic. This modification also restricts the flexibility of alkyl chain.



TPA= Phosphonic trianhydride

Keywords: Carboxamide; Unsaturated carbonyl; Gingerol; Vanilloids.

P21

Synthesis, Characterization and Antimicrobial Properties of Copper(II) Complexes of Heterocylic Ligands

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β-mangostin complexes with copper(II) were prepared by 2 : 1 molar reaction of ligand and copper(II) acetate in one-pot reaction. The resulting complexes has been characterized by spectroscopic techniques. Ligands and their metal complexes were tested against *Escherichia coli*, *Pseudo aeruginosa*, *Protes vulgaris*, *Klebsiella pneumonia* and *Salmonella pneumoniae* bacteria to assess their antibacterial action using Minimum Inhibitory Concentrations (MICs) method and confirm with Minimum Bactericidal Concentrations (MBCs) method. The result shows that the complex has octahedral geometry with the general formula $[ML_2(H_2O)_2]$, in which L = β-mangostin. Ligands were completely inactive against bacteria whereas the copper(II) β-mangostin complex has significant action on bacteria, indicating that it has a good potential as bactericide.

Keywords: Metal complexes; Xanthone; Antimicrob; Spectroscopic techniques.

Synthesis Of Chalcone Derivatives

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Chalcones of natural sources have gained interest because of their broad pharmacological activities. Natural prenylated chalcones isolated from *Artocarpus lowii* namely 2',4'-dihydroxy-4-methoxy-3'-prenyldihydrochalcone, 2',4',4-trihydroxy-3'-prenylchalcone and 2',4-dihydroxy-3',4'-(2,2-dimethylchromene)chalcone had demonstrated good antioxidant properties. In this study, chalcone derivatives were synthesized using prenylated acetophenone or benzaldehyde as the main precursor. 2,4-Dihydroxyacetophenone, 2,4-dihydroxybenzaldehyde, 4-hydroxybenzaldehyde were prenylated using 2-methyl-3-buten-2-ol in the presence of boron trifluoride etherate ($BF_3.Et_2O$) to afford 2,4-dihydroxy-3-*C*-prenylacetophenone (**1**), 2,4-dihydroxy-5-*C*-prenylacetophenone (**2**), 2,4-dihydroxy-3-*C*-prenylbenzaldehyde (**3**) and 4-hydroxy-3-*C*-prenylbenzaldehyde (**4**) respectively. Prenylation of 2,4,6-trihydroxyacetophenone was also conducted using prenyl bromide in the presence of several catalysts which were anhydrous potassium carbonate and DBU/THF to afford four different products 2,4,6-trihydroxy-3-*C*-prenylacetophenone (**5**), 2,6-dihydroxy-4-*O*-prenylacetophenone (**6**), 2,6-dihydroxy-3-*C*-prenyl-4-*O*-prenylacetophenone (**7**) and 1-(5,7-dihydroxy-2,2-dimethyl-3,4-dihydro-2*H*-chromen-8-yl)ethanone (**8**) respectively. By using Claisen-Schmidt condensation, the respective prenylated acetophenone or benzaldehyde were coupled with 4-hydroxybenzaldehyde or 2,4-dihydroxyacetophenone under basic condition to obtain the desired chalcone derivatives. In order to investigate the best condition for the synthesis of prenylated chalcones, 2,4-dihydroxyacetophenone underwent Claisen-Schmidt condensation with hydroxybenzaldehyde using 60% KOH to acquire the desired 2',4',4-trihydroxychalcone (**9**), 2',2,4'-trihydroxy-3-methoxychalcone (**10**) and 2',2,4'-trihydroxy-4-methoxychalcone (**11**). The structure of pure compounds were confirmed spectroscopically by ^1H NMR and IR. The antioxidant properties were tested for all the products. Compounds (**10**) and (**11**) were tested positive in 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ABTS assay.

Keywords: Chalcone; Claisen-Schmidt condensation; ABTS, DPPH.

P23

Stereoselective Reduction of 1-Benzyl-3,3-Dimethyl-5-Methylenepyrrolidine-2,4-Dione using Selected Metal Borohydrides

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1-benzyl-3,3-dimethyl-5-methylenepyrrolidine-2,4-dione is an intermediate product produced during the total synthesis towards natural bioactive compound, Zopfiellamide A. The compound was synthesized via four main steps including dimethylations, addition with $CuBr_2$, cyclization with phenylamine and reaction with formaldehyde. The corresponding intermediate contained α,ß-unsaturated ketone with exo-alkene group and it was subjected to reduction using selected metal borohydrides. The metal borohydrides used was form in-situ from the reaction of sodium borohydrides with selected metal salts. In this study, the effect of metal borohydrides used towards the hydride transfer mechanism was investigated based on the stereochemical outcome of the product.

Keywords: Stereoselective; Reduction; Metal borohydrides; Exo-alkene.

P24

Synthesis of Novel Drug-like Compounds against Multi-drug Resistant Gram Negative Bacteria Targeting CTX-M Class A beta lactamase

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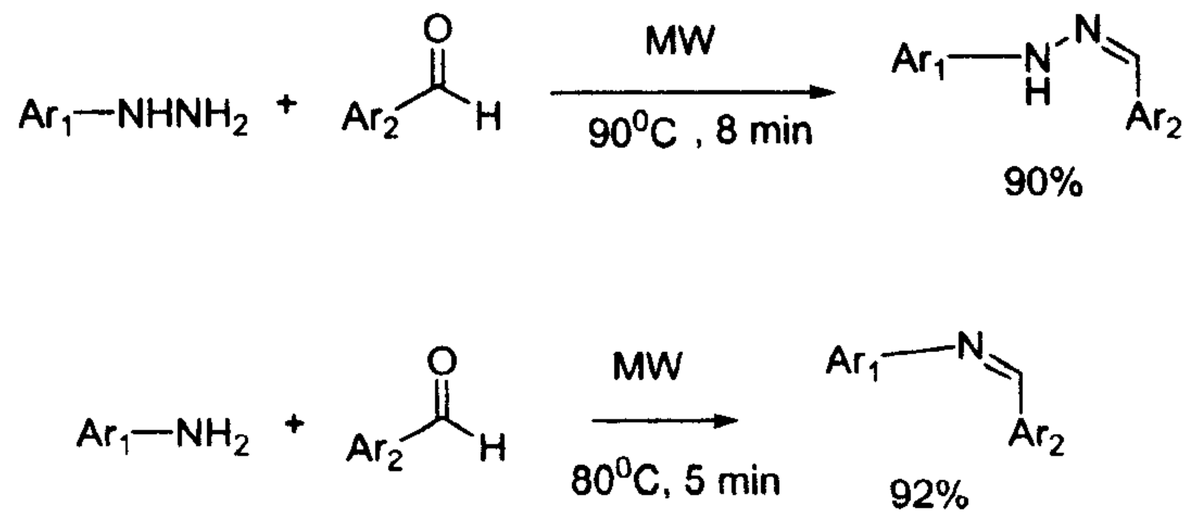
Development of microbial resistance to the existing antibiotics is one of the biggest problems in health care. Thus one of the research priorities is the discovery of new generation antibiotics to combat multidrug resistance. One of the major reasons for developing resistance by gram –ve bacteria towards latest generantion antibiotics is the expression of CTX-M Class A beta lactamase. It is also identified as potentially attractive drug target for the development of new generation drug-like compounds. The receptor-based drug discovery approach is adopted to design novel compounds using PDB ID: 4DE0 and the following classes of compounds were synthesised. Synthesis of imine and hdyrazide hydrazones:



The compounds were tested for their antimicrobial activity against referernce strain and multi-drug resistant clinical isolates of *Acinetobacter baumannii*. The compounds MIC were ranging from 0.5 to 20 μM against various isoaltes.

Keywords: Gram –ve bacteria; *Acinetobacter baumannii*; CTX-M-9 β-lactamase; Antibiotic resistance.

Synthesis of 2-(*p*-Amino phenyl)-5-(1,2,4 triazo N-methyl)-1,2,4 Triazole and Evaluation Its Activity Against Multi-drug Resistant Bacteria

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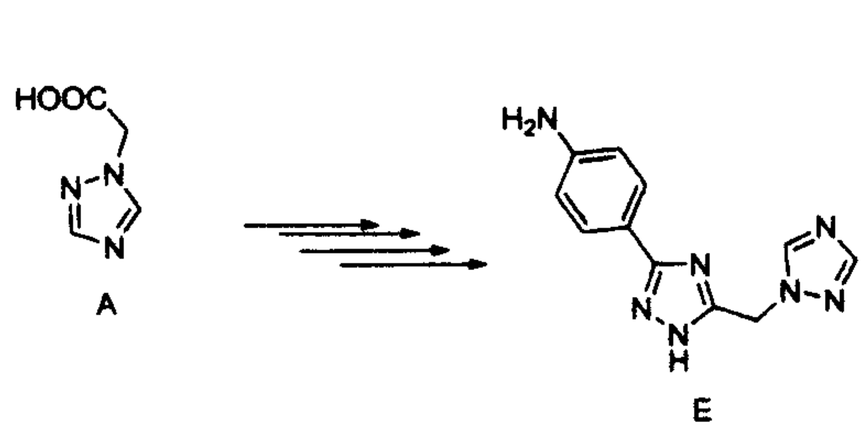
Multidrug resistance is an antimicrobial resistance developed by microbes to a number of existing antibiotics. Its being increased at alarmingly high rate and is considered as one of the major threats to public health espeically in developing countries. In an attempt to discover novel drug-like compound acting against multidrug resistant gram –ve and gram +ve bacteria, we synthesised 2-(p-aminophenyl)-5-(1,2,4-triazo-N-methyl)-1,2,4-triazole using 1-N-ethane nitrile and 1,2,4-tirazoles as starting materials.



The compound has shown promising antimicroibal activity against gram –ve and gram +ve bacteria The efficacy of this compound was tested against reference strain and multi-drug resistant clinica isolates of *Acinetobacter baumannii* (gram –ve) and *Staphyloccous aureus* (gram +ve). The compound's MIC was found to be in the range of 0.1 to 50 μM against various isolates. *In silico* phising of molecualr targets indicate that this compound's targets could be CTX-M-9 β-lactamase in *Acinetobacter baumanni* and pyruvate kinase in *Staphylococcus aureus*. Molecuar docking studies further confirmed this compound could be targeting CTX-M-9 β-lactamase and pyruvate kinase These results suggesting this compound has potential to be further investigated to confirm its broad spectrum antimicrobial activity against multidrug resistant bacteria.

Keywords: 1,2,4-Triazole; Aniline; Multidrug resistant bacteria; Antimicrobial.

A Novel Method for Synthesis of New Vanilloids and *in vitro* Evaluation Their Anti-Inflmmatory Activity

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Organic compounds containing vanillyl moiety (4-hydroxy-3-methoxybenzyl) are known as vanilloids. These are usually found in plants that have been routinely consumed as food spices. Majority of vanilloids like curcumin, gingerols etc., possess valuable pharmacological activities including anti-inflammtory activity. In our previous studies, we have identified important pharmacophores present in natural vanilloids. Therefore, we have synthesised few novel vanilloids (gingerol analogues) retaing important pharmacophores of natural vanilloids and replacement of alkyl group with various bioisostere groups using proline dipeptide as a reusable catalyst.

The compounds have shown potent anti-inflammatory activity in Greiss assay using mouse macophages, RAW 264.7 cells. The IC_{50} value range from 1 to 10 M. *In silico* phsihing of molecular targets suggesting these compounds are targetting TLR-4/MD-2 dimersiation pathway in inflammation. Molecualr docking studies further confirmed that these compound might work through inhibition of TLR/MD-2 dimerisation.

Keywords: Vanilloids; Proline dipeptide; Anti-inflammatory activity; TLR-4/MD-2.

Synthesis of Several Stereoselective Sesquiterpenoids from Xanthorrhizol and Zerumbone Isolated from *C. Xanthorrhiza* and *Z. Zerumbet* Respectively

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Xanthorrhizol was isolated from the essential oil of fresh rhizomes of *C. xanthorrhiza* by fractionation using vacuum liquid chromatography and column chromatography. Several bisabolane-type sesquiterpenoids have been synthesised from this xanthorrhizol. Both diastereomers of 10,11-dihydro-10,11-dihydroxyxanthorrhizols, have been prepared in three steps from xanthorrhizol *via* Sharpless asymmetric dihydroxylation as the key steps. Fremy's salt oxidation of xanthorrhizol gave curcuquinone, which was successfully reduced with sodium dithionite to curcuhydroquinone. Sequential acetylation and Sharpless asymmetric dihydroxylation on curcuhydroquinone led to the diacetate derivative of helibisabonol A. Cleavage of the diacetate esters by reduction with lithium borohydride furnished helibisabonol A. An allylic alcohol derivative of *O*-methylxanthorrhizol, (3*S*,6*R*)-(3-methoxy-4-methylphenyl)-2-methylhept-1-en-3-ol, has been synthesised from xanthorrhizol in five steps *via* Sharpless asymmetric dihydroxylation as the key steps. Zerumbone has been isolated from the essential oil of *Zingiber zerumbet* by recrystallization from *n*-hexane. Treatment of zerumbone with *m*-chloroperbenzoic acid (MCPBA), followed by methanolysis with *N*-bromosuccinimide (NBS) and methanol gave 2-hydroxy-3-methoxy-6,9-humuladien-8-one, while acetylation of 2-hydroxy-3-methoxy-6,9-humuladien-8-one afforded 2-acetoxy-3-methoxy-6,9-humuladien-8-one. Under nitrogen, zerumbone was reduced with lithium aluminium hydride ($LiAlH_4$) at -5°C to -10°C to afford zerumbol. Acetylation and methylation of zerumbol gave 8-acetoxy-2,6,9-humulatriene and 8-methoxy-2,6,9-humulatriene, respectively. 2,3-Epoxy-6-ethoxy-9-humulen-8-one has been obtained by treating zerumbone with ethanol at 10°C to 15°C in the presence of boron trifluoride-etherate as catalyst, followed by epoxidation with *m*-chloroperbenzoic acid (MCPBA). 6,10-Dicyano-2-humulen-8-one was prepared by treatment of zerumbone with potassium cyanide at 15°C to 20°C in the presence of α-cyclodextrin. The deoxygenation of the zerumbone under the Clemmensen reduction, followed by Sharpless asymmetric dihydroxylation yielded (6*S*,7*S*)-6,7-dihydroxy-2,9-humuladien-8-one and (9*S*,10*S*)-9,10-dihydroxy-2,6-humuladien-8-one as the major and minor compounds respectively. Acetylation of (6*S*,7*S*)-6,7-dihydroxy-2,9-humuladien-8-one afforded (6*S*,7*S*)-6-acetoxy-7-hydroxy-2,9-humuladien-8-one, while further treatment of the acetoxy compound in the presence of 4-*N*,*N*-dimethylaminopyridine (DMAP) as catalyst gave (6*S*,7*S*)-6,7-diacetoxy-2,9-humuladien-8-one. (9*S*,10*S*)-9,10-Diacetoxy-2,6-humuladien-8-one has been obtained by acetylation of (9*S*,10*S*)-9,10-dihydroxy-2,6-humuladien-8-one in the presence of 4-*N*,*N*-dimethylaminopyridine (DMAP) as catalyst.

Keywords: Xanthorrhizol; Zerumbone; Sharpless AD; Acetylation.

Palladium Supported on Nitrogen Based Metal Organic Frameworks as an Efficient and Reusable Catalyst for Heck Coupling Reaction

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Three nitrogen base Metal Organic Frameworks (MOFs) which are from amine, nitro and nitrile group were synthesized via post synthetic modification and solverthemal methods. The synthesize products were characterized by thermal gravimetric analysis (TGA), field emission scanning electron microscopy (FESEM), fourier transform infrared (FTIR) and nuclear magnetic resonance (NMR) spectroscopies. Characterization shows the complexation of nitrogen based ligands with metal linker of Zinc was successfully forming MOFs. Meanwhile, the thermal gravimetric analysis was revealed that all the MOFs compounds exhibits thermal stability at high temperature. Despite of that, the synthesized MOFs supported palladium complexes were subjected to the carbon-carbon cross coupling reaction, Heck reaction. The results show the Pd/MOF-NH_2 catalyst gave conversion of product up to 100% at 100°C using Na_2CO_3 as a base. These higher activities of Pd/MOF-NH_2 may be explained in terms of functional group of MOFs. The cross coupling Heck reaction of bromobenzene using Pd/MOF-NH_2 catalyst shows excellent recyclability of catalyst as well in leaching testing. The catalyst was reused up to five times with little loss of activity.

Keywords: Metal organic framework; Heterogeneous catalyst; Heck reaction; Reusable catalyst.

Synthesis and Molecular Simulation of a Magnetically Recyclable Heterogeneous BINOL Organocatalyst for the Asymmetric Aldol Reaction

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(R)-1,1'-bi-2-naphthol (BINOL), a chiral organocatalyst was employed to be immobilised onto magnetic iron oxide particle (MIOP). This heterogeneous organocatalyst was characterised using infrared spectroscopy (FTIR), thermal gravimetric analysis (TGA) and scanning electron microscope (SEM). The performance of BINOL-grafted MIOP (BINOL-MIOP) was then evaluated using aldol reaction between benzaldehydes and cyclic ketones. Comparative studies between homogeneous versus heterogeneous aldol reaction revealed the similar reactivity for both reaction systems. The reaction system mediated by BINOL-MIOP was versatile to produce aldol adducts in moderate-to-good yields (45-99%) from different benzaldehydes and cyclic ketones. More *syn* adducts were produced in most cases. Up to 35% ee was observed in *anti* adducts, despite that a higher 50% ee of *anti* adduct was observed in the homogeneous reaction system. The experimental results were in agreement with the observations from the molecular modelling that revealed the reduced selectivity in the heterogeneous system, which was possibly caused by the torsional angle distortion of BINOL after immobilisation. In contrast to the free-BINOL, the distorted-BINOL exhibited lower tendency to form a complex with aldehyde, thereby reducing the selectivity that the free-BINOL could deliver. In addition, the reaction system mediated by BINOL-MIOP was exhibiting an excellent reusability for up to 10 cycles of reactions.

Keywords: Magnetic iron oxide particles; BINOL; Density function theory; Molecular dynamics simulation.

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